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**REPORT OF THE JOINT IPCS-NIEHS WORKSHOP ON
THE PROMOTION OF COLLABORATIVE RESEARCH AMONG
SCIENTISTS IN DEVELOPING AND DEVELOPED COUNTRIES**

25-26 February 2004
Research Triangle Park, North Carolina USA

**Report Prepared for the WHO/UNEP/ILO
International Programme on Chemical Safety**

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JOINT NIEHS – WHO/IPCS WORKSHOP ON THE PROMOTION OF COLLABORATIVE RESEARCH AMONG SCIENTISTS IN DEVELOPING AND DEVELOPED COUNTRIES

1. Introduction

This workshop was convened and supported by the National Institute of Environmental Health Sciences (NIEHS) and the WHO/UNEP/ILO International Programme on Chemical Safety (IPCS). It was hosted and organized by the Interregional Research Unit (IRRU) of the IPCS and held in Research Triangle Park, North Carolina, 25-26 February 2004. Dr William Suk, Director, Center for Integrated Risk and Science, Division of Extramural Research and Training, welcomed the participants on behalf of the NIEHS and Dr Jenny Pronczuk, Medical Officer, IPCS, on behalf of WHO. A list of participants is provided in Annex A.

2. Background

Dr Terri Damstra, IPCS/IRRU, summarized the background and objectives of the workshop. The IPCS/IRRU, established in 1984 via a Cooperative Agreement between NIEHS and WHO, implements activities addressing global environmental health issues of priority to both NIEHS and IPCS. Currently, these global issues include children's health and the environment, endocrine disruptors and persistent toxic substances, biomarkers, gene-environment interactions, vulnerable populations, and improved risk assessment methodologies.

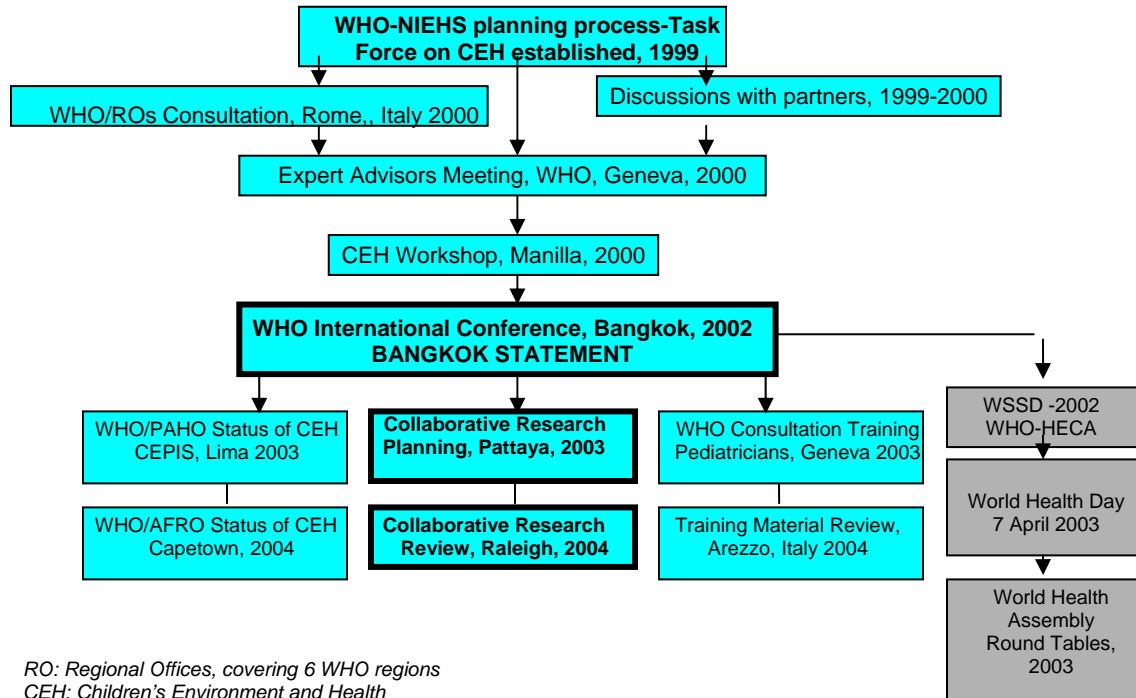
For each of these priority areas, the following step-wise implementation strategy has been developed:

- establish expert advisory group and plan of action,
- build and/or enhance network of partners and donors,
- assessment of problem, data collection, identification of key concerns, data gaps, and research needs,
- promotion of collaborative research among scientists in developing and developed countries to address key concerns and data gaps.

It is through this process that strengthened collaborative networks; data generation, training; technology transfer; capacity building; and strategies for remediation, intervention and public health promotion are established.

This stepwise implementation strategy combined with a Regional approach has worked very successfully in the area of children's environmental health (CEH), as illustrated in Figure 1. A regional approach is more effective since many environmental problems are regional in nature and since WHO has a regional organizational structure, effective regional partners, networks, and infrastructure has already been established.

Figure 1



RO: Regional Offices, covering 6 WHO regions
 CEH: Children's Environment and Health
 WSSD: World Summit on Sustainable Development
 HECA: Healthy Environments and Children Alliance (WHO initiated Global Alliance)

As indicated in Figure 1, activities related to children's environmental health (CEH) started in 1999 in the Southeast Asian and Western Pacific Region with the planning process, consultation with partners, the establishment of an expert advisory group and the WHO Task Force on Children's Environmental Health. The Manila Workshop in 2000 gathered data on the key environmental threats to children in this Region. The 2002 International Bangkok Conference on Environmental Threats to Children was pivotal in strengthening collaborative networks among scientists in developing and developed countries and catalyzing additional regional and global action. The Bangkok Statement (Annex B), urged WHO to support CEH efforts in four key areas, including the promotion of collaborative research on environmental factors that have an impact on children's health. Building upon the priority research areas and potential partners identified at the Bangkok conference, a subsequent workshop was convened in Pattaya, Thailand, in 2003, focusing specifically on "the Promotion of Collaborative Research." At the Pattaya workshop, a number of opportunities for

collaborative research were identified and evaluated, and several key areas were prioritized for further development. The following “pilot” collaborative studies among scientists in developing and developed countries were:

- arsenic exposure in pregnant women and children,
- asthma in children,
- pesticides and POPs,
- gene-environment interactions,
- feasibility of national children’s studies in developing countries.

3. Objectives of Workshop

The objectives of the current workshop were:

- To identify key requirements for effective research collaboration and obstacles that hinder successful implementation of research collaboration.
- Review the current status of the five pilot collaborative research projects identified at the workshop in Pattaya, Thailand.
- Recommend additional strategies and research areas that need strengthened collaboration and increased attention.

4. Key Requirements for Effective Research Collaboration

Participants discussed their experience with establishing research collaborations among colleagues in developing and developed countries, including successes and failures. It was agreed that there is a natural synergy for collaboration between developing and developed countries, by utilizing the different expertise, conditions, exposures, and populations of the respective countries. It was noted that most collaborations are initiated through informal contacts and networking (e.g., attendance at international meetings; recommendations from colleagues; etc.) and utilizing existing “cobbled-together” resources.

Once such collaborations have been identified, formal programs for international collaborations (e.g. Fogarty International Training (FIC) and Research Programs; Fellowships; university and private foundations, etc.) can be “tapped” to expand these collaborative efforts. This process is illustrated by Dr Carpenter’s successful and long-term collaborations with scientists in central and eastern Europe. Initial contacts were made and collaborations initiated in the 1980’s at a series of workshops in central and eastern Europe sponsored by the NIEHS Superfund Program. Subsequently, Dr Carpenter was awarded FIC training and research programs, and numerous potential collaborating scientists in central and eastern Europe were able to receive multidisciplinary training (ranging from toxicology and epidemiology to industrial hygiene). The collaborations initiated in the 1980’s have expanded synergistically and are still ongoing.

Participants stressed that most existing funding sources are too inflexible and inadequate to meet the needs for collaboration with developing countries. Funding for equipment, exchange visits, and training of collaborators is usually not available at the initiation of collaboration. Competitive grant mechanisms (e.g., foreign international collaborative research awards from FIC) require considerable initial pilot data to meet funding considerations. Projects submitted for funding from private foundations and charitable institutions usually must meet pre-determined goals and objectives. All participants agreed that most existing funding sources are too inflexible and inadequate to meet the needs for collaboration with developing countries.

Participants reiterated that WHO sponsored workshops, symposia, and conferences play a critical role in facilitating, promoting, and establishing initial collaborations. Particularly, in the developing world, WHO has credibility and can help open doors to the existing regional and local institutions and bureaucracies. WHO also has knowledge of existing scientific expertise in the Region and its Member States.

Participants discussed key requirements for successful collaboration and common obstacles that have hindered such collaboration. These are summarized in Table 1.

5. Status of Pilot Collaborative Research Projects.

A. Collaborative studies on the health effects of arsenic in pregnant women and children in the US and Southeast Asia.

Collaborators: Chulabhorn Research Institute, Thailand; University of Arizona, USA; Dartmouth University, USA

The objectives of this collaboration are to investigate the effects of arsenic exposure during pregnancy on newborns, infants and children in Southeast Asia and the US. The results of this study will aid many communities in Southeast Asia the US and elsewhere to determine the role of genotypic polymorphisms and the levels of arsenic exposure in the causation of adverse effects in children.

TABLE 1

KEY REQUIREMENTS FOR SUCCESSFUL RESEARCH COLLABORATION	COMMON OBSTACLES THAT HINDER SUCCESSFUL RESEARCH COLLABORATION
<ul style="list-style-type: none"> • Strong personal commitment of all collaborators. 	<ul style="list-style-type: none"> • Lack of innovative funding mechanisms <ul style="list-style-type: none"> - exchange visits of scientists - educate reviewers, institutional review boards, etc., about needs of developing countries. - funding for equipment in developing countries
<ul style="list-style-type: none"> • Equality/mutual respect of all members of research team. 	<ul style="list-style-type: none"> • Lack of financial sophistication of some institutions in developing countries.
<ul style="list-style-type: none"> • Research topic must be of mutual priority and of benefit to the population being studied. 	<ul style="list-style-type: none"> • Attitude of superiority of some western collaborators.
<ul style="list-style-type: none"> • Community participation; local ownership. 	<ul style="list-style-type: none"> • Lack of sensitivity to local, cultural, social, ethnic, language difficulties.
<ul style="list-style-type: none"> • Understand local customs, regulations, terminology. 	<ul style="list-style-type: none"> • Difficulties dealing with local, national, WHO bureaucracies and policies.
<ul style="list-style-type: none"> • Personal appearance of western scientists; but local scientists should negotiate with local community officials. 	<ul style="list-style-type: none"> • Misunderstanding of local laws (e.g., export of biological specimens).
<ul style="list-style-type: none"> • Extend areas of scientific expertise in a synergistic and complementary manner. 	<ul style="list-style-type: none"> • Lack of adequate equipment, trained personnel, quality assurance procedures.
<ul style="list-style-type: none"> • Ensure research facility has appropriate equipment, trained personnel, harmonized protocols, and quality assurance procedures. 	<ul style="list-style-type: none"> • Hidden occupational health and safety issues for researchers.
<ul style="list-style-type: none"> • Supportive of long-term gains; transcending the limits of specific research projects (e.g., training, capacity building, technology transfer). 	
<ul style="list-style-type: none"> • Utilize, train the trainer's approaches. 	

One region in Thailand, identified as having arsenic contaminated well water, will be studied and compared with populations in the U.S. Urinary profiles of arsenic, genetic profiles, polymorphisms, gene expression will be analyzed.

Current Status:

Summary of Phase I (analysis of arsenic levels) in Thailand:

- The “drinking water” levels of arsenic in Thailand are now fairly low.
- 50% of pregnant women had detectable levels of arsenic in their nails samples (above 20 ug/100 ug, roughly top 10th percentile of the New Hampshire samples). 1 sample was extremely high (170 ug/g).
- Thus, it is likely a number of women are being exposed to levels (between 10 ug/L and 50 ug/L in water), and some are exposed to extremely high levels.
- The study will focus on biomarkers and toxicogenomic endpoints.
- An expanded survey will be conducted in the region to double the number of women who can be recruited from 50 per year to 100 per year (providing 200 women-infant pairs after 2 years).
- The number will not be sufficient to evaluate clinical outcomes other than continuous variables such as birth weight, gestational age, maternal blood pressure, and possibly neurobehavioral scores.

Plans over the next 3 to 6 months:

• Obtain protocols from collaborators
• Complete survey of additional villages
• Set up ICP-MS in Thailand
• Training of technician in Arizona/New Hampshire
• Finalize protocol for phase II study : water, urine, maternal blood and cord blood, meconium
• Finalize questionnaire for phase II study, include neurodevelopment
• Run replicates across labs
• Establish genotype prevalence

Timeline and Funding:

Completion of pilot	3 to 6 months	Chulabhorn, Dartmouth, Arizona
Phase II startup and recruitment	6 to 30 months	Chulabhorn, Dartmouth, Arizona
Laboratory analyses	6 to 32 months	To be determined (Fogarty)
Statistical Analyses	12, 24, 36 months	To be determined (Fogarty)
Phase III: Follow-up to age 5	36+ months	To be determined (NIH-R01)

- B. *Collaborative studies on asthma in children: Indian birth cohort study*
Collaborators: University of Western Australia, Australia; International Pediatric Association, New Delhi, India; WHO Southeast Asian Regional Office, New Delhi, India.

The **general aims** of the study are to collect prospective, longitudinal data in different regions of India to determine:

- The normal development of the immune system in early life;
- How interaction with various environmental exposures impacts on this;
- Characterize the important factors contributing to the development of asthma and allergies in Indian children.

Outline of Project

- Birth cohort of 2500 (5 sites across India)
 - High & low risk for asthma/allergies
 - High, mid, low SE status
 - Variety of environmental exposures
- Follow children till 5years of age
 - Growth & Development
 - Environmental exposures (air, water, allergens)
 - Infections (respiratory, GIT, infectious diseases)
 - Vaccinations
- Primary outcome: asthma and allergies at 5years
 - Clinical, immunology, lung function tests, genetics

Current Status

- The concept for the collaborative study was developed and endorsed at the Pattaya workshop; the study to be coordinated by Dr Peter Sly in conjunction with Indian investigators.
- A local co-ordinator (Dr. Swati Bhawe) has been appointed and she has recruited the study centres and site investigators.
- The study is based on birth cohort studies conducted in Perth, Australia. However, the need for a feasibility pilot study to be held in Pune, India, has been recognized.
- A protocol development workshop was held in Pune and site visits conducted.
- An initial R21 application has been submitted to NIH/NIEHS to fund the pilot study.

Pilot Study

To demonstrate the feasibility of:

- Recruiting a birth cohort antenatally, including families with a range of environmental exposures;
- Monitoring exposures early in life for both the indoor and outdoor environments of the infants in the cohort;
- Monitoring the normal growth and development of the cohort;
- Monitoring respiratory tract and other contracted infections during the cohort's early life;
- Monitoring the normal development of the infant's immune system and the impact of environmental exposures on this development.

C. Collaborative studies on POPs and Pesticides in Southeast Asia and the Western Pacific Region

Collaborators: To be confirmed.

Persistent organic pollutants (POPs) are of international concern; they are known to have been transported long distances all over the globe, to accumulate in the food chain, and to adversely impact human health, particularly during fetal, neonatal, and childhood development. Many POPs are also pesticides, and higher levels have been found in developing countries. Countries in Southeast Asia have expressed an urgent need to obtain monitoring of data on levels of POPs and pesticides in children. At the Pattaya workshop, it was proposed that specific existing laboratories in the region (e.g., Malaysia, Thailand) serve as a resource for the entire region for the analysis of POPs. Several laboratories in the Region have the facilities and equipment to analyze POPs, but the staff needs technical training in quality assurance procedures and certain analytical methods. Funding will also be necessary for these laboratories to serve as a resource for other countries in the region.

Current status:

WHO/IPCS/IRRU is pursuing funding for this proposed collaboration.

D. Gene-Environment Interactions – Toxicogenomic Biomarkers of Benzene Exposure
Collaborators: Center for Research on Occupational and Environmental Toxicology
of Oregon Health and Science University, Portland, Oregon; Chulabhorn Research
Institute, Bangkok, Thailand

The long term goals of this collaboration are to develop robust biomarkers of exposure to benzene. The development of microarray technology and its application to the study of gene and protein expression provides a powerful tool with which to assess the interaction of environmental agents with the human genome and proteome, and the consequences for child health in the short and long term. Application of this powerful technology generates data that can be used to 1) illuminate mechanisms of chemical-induced disease and 2) to develop biomarkers of exposure to substances that may induce disease. These approaches address the long-term goals of this research program, namely to identify genomic fingerprints of benzene exposure in rodents as an initial step in developing robust biomarkers of human exposure to this genotoxic and neurotoxic air pollutant. The Chulabhorn Research Institute (CRI) has identified populations of school children in Bangkok and surrounding environments that are exposed to high and low levels of benzene. Eventually, these children will be examined for the existence of a toxicogenomics fingerprint of benzene exposure that parallels that identified in the rodent studies. This fingerprint may then have utility in identifying children at risk in environments that are unsuitable for the placement of schools.

Current status:

The research plan is in three stages of which only the first has been funded at this time: (1) toxicogenomics technology transfer from the U.S. to Thailand, (2) toxicogenomics research with rodents exposed to benzene, and (3) studies with children. The latter two will be performed at CRI. Implementation of the first component is underway. Training of one scientist has been carried out at the Center for Research on Occupational and Environmental Toxicology of Oregon Health and Science University, Portland, Oregon.

E. Feasibility of Long-Term Studies (LTS) on Children's Environmental Health in Developing Countries

The first international consultation with experts on cohort studies was organized October 2003 (Glion, Switzerland) to assess the feasibility of longitudinal, long-term studies (LTS) on children's environmental health in developing countries and make recommendations for action. Participating countries are considering the inclusion of environmental health components into upcoming long-term studies.

A letter of intention (LOI) requesting funds for a major international initiative on LTS was prepared through consultative process (December 2003) and submitted to a donor (other submissions are also under consideration). A draft 6-minute video on LTS (CD version) is under preparation at the Rand Afrikaans University (to be finalized by mid-

2004. An article on LTS in developing countries is being drafted (for publication in an international pediatrics journal).

The 2nd consultation on LTS is planned for August 2004 (hosted by PAHO) to address: (i) incorporation of environmental health components into on-going studies, and (ii) biomarkers of exposure in children. Linkages are maintained with the National Children's Study (NCS) in the USA; Dr Pronczuk and Dr Krotoski, National Institute of Child Health and Human Development, Co-chair an International Interest Group of the NCS.

6. Additional Strategies and Research Areas for Strengthened International Collaboration and Research Networking

Participants were pleased with the progress and status of the current pilot collaborative studies in the Western Pacific and Southeast Asian countries. It was noted that the environmental health problems in other parts of the world, namely the least developed countries (LDCs), most of which are in the African Region (AFRO) have been neglected. For example, food contamination (e.g., acrylamide, aflatoxins), natural toxins, and malnutrition are major environmental threats in these countries. The strategy for establishing collaborations in LDCs must start with building infrastructures, scientific training, and bringing together multi-disciplinary sectors within a country. Established scientific societies (e.g., African society for Toxicological Sciences) can be extremely helpful for building solid and sustainable foundations for future research collaborations in these countries.

It was also noted that to date most of the collaborative activities have focused on a chemical-specific approach; and it was recommended that increased attention be given to disease and health outcomes of environmental threats. Furthermore, the focus has been on single chemicals or single sources of exposures, which does not reflect real-life situations. Additional emphasis is needed on the effects of multimedia, cumulative, and repeated exposures to mixtures of chemicals.

Participants reiterated the benefits of forming regional resource centers (e.g., laboratories for sample analysis; information dissemination centers). The formation of a network of Children's Environmental Health Centers, with certain centers providing a specific resource function, could serve as a prototype. It was noted that center-to-center and institution-to-institution arrangements could be very cost-effective and can offer additional multi-disciplinary collaborative opportunities as well as sources of potential funding.

It was also recommended that WHO encourage funding organizations (e.g., NIH) to take into consideration the special needs and requirements of collaborations with developing and least developed countries; including the education of grant reviewers and institutional review boards about such requirements. Furthermore, WHO should recommend that universities worldwide build capacities within their university system to foster faculty

collaboration with scientists in the developing world (e.g., 2-3 month periodical sabbaticals to work in developing countries).

7. Conclusion

Since the February 2003 Pattaya workshop, remarkable progress has been made in the Western Pacific and Southeast Asian Regions in establishing collaborative partnerships and networks, specifically on 4 “pilot” research projects, utilizing “seed money” to WHO/IPCS provided by NIEHS and existing resources provided by the collaborators. Participants emphasized that, although it will be a challenge to obtain sustainable funding, it is critical that these projects continue and priority be placed on their successful completion. The results were presented at this workshop indicate that the current WHO/IPCS strategy of utilizing a Regional, flexible and multi-step approach (starting from the initiation of partnerships to the implementation of collaborative research) works very well and should be used as a model to expand such collaborations to other priority research areas and to other Regions of the world.

ANNEX A

IPCS/NIEHS WORKSHOP ON “PROMOTION OF COLLABORATIVE RESEARCH BETWEEN SCIENTISTS IN DEVELOPED AND DEVELOPING COUNTRIES”

25-26 FEBRUARY 2004

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* Invited, but unable to attend.

ANNEX B

THE BANGKOK STATEMENT

A pledge to promote the protection of Children's Environmental Health

We, the undersigned scientists, doctors and public health professionals, educators, environmental health engineers, community workers and representatives from a number of international organizations, from governmental and non-governmental organizations in South East Asian and Western Pacific countries, have come together with colleagues from different parts of the world from 3 to 7 March 2002 in Bangkok, Thailand, to commit ourselves to work jointly towards the promotion and protection of children's health against environmental threats.

Worldwide, it is estimated that more than one-quarter of the global burden of disease (GBD) can be attributed to environmental risk factors. Over 40% of the environmental disease burden falls on children under 5 years of age, yet these constitute only 10% of the world population. The environmental burden of paediatric disease in Asia and the Pacific countries is not well recognized and needs to be quantified and addressed.

WE RECOGNIZE

That a growing number of diseases in children have been linked to environmental exposures. These range from the traditional waterborne, foodborne and vector-borne diseases and acute respiratory infections to asthma, cancer, injuries, arsenicosis, fluorosis, certain birth defects and developmental disabilities.

That environmental exposures are increasing in many countries in the region; that new emerging risks are being identified; and that more and more children are being exposed to unsafe environments where they are conceived and born, where they live, learn, play, work and grow. Unique and permanent adverse health effects can occur when the embryo, fetus, newborn, child and adolescent (*collectively referred to as "children" from here onwards*) are exposed to environmental threats during early periods of special vulnerability.

That in developing countries the main environmental health problems affecting children are exacerbated by poverty, illiteracy and malnutrition, and include: indoor and outdoor air pollution, lack of access to safe water and sanitation, exposure to hazardous Chemicals, accidents and injuries. Furthermore, as countries industrialize, children become exposed to toxicants commonly associated with the developed world, creating an additional environmental burden of disease. This deserves special attention from the industrialized and developing countries alike.

That environmental hazards arise both from anthropogenic and natural sources (e.g. plant toxins, fluoride, arsenic, radiations), which separately and in combination can cause serious harm to children.

That restoring and protecting the integrity of the life-sustaining systems of the earth are integral to ensuring children's environmental health now and in the future. Therefore, addressing global changes such as human population growth, land and energy use patterns, habitat destruction, biodiversity loss and climate change must be part of efforts to promote children's environmental health.

That despite the rising concern of the scientific community and the education and social sectors about environmental threats to children's health and development, progress has been slow and serious challenges still remain.

That the health, environment and education sectors must take concerted action at all levels (local, national, global), together with other sectors, in serious efforts to enable our countries to assess the nature and magnitude of the problem, identify the main environmental risks to children's health and establish culturally appropriate monitoring, mitigation and prevention strategies.

WE AFFIRM

That the principle "**children are not little adults**" requires full recognition and a preventive approach. Children are uniquely vulnerable to the effects of many Chemical, biological and physical agents. All children should be protected from injury, poisoning and hazards in the different environments where they are born, live, learn, play, develop and grow to become the adults of tomorrow and citizens in their own right.

That all children should have the right to safe, clean and supportive environments that ensure their survival, growth, development, healthy life and well-being. The recognition of this right is especially important as the world moves towards the adoption of sustainable development practices.

That it is the responsibility of community workers, local and national authorities and policy-makers, national and international organizations, and all professionals dealing with health, environment and education issues to ensure that actions are initiated, developed and sustained in all countries to promote the recognition, assessment and mitigation of physical, Chemical and biological hazards, and also of social hazards that threaten children's health and quality of life.

WE COMMIT OURSELVES

To developing active and innovative national and international networks with colleagues, in partnership with governmental, nongovernmental and international organizations for the promotion and protection of children's environmental health, and urge WHO to support our efforts in all areas, especially in the following four:

- 1. PROTECTION AND PREVENTION – To strengthen existing programmes and initiate new mechanisms to provide all children with access to clean water and air, adequate sanitation, safe food and appropriate shelter:**
 - Reduce or eliminate environmental causes and triggers of respiratory diseases and asthma , including exposure to indoor air pollution from the use of biomass fuels and environmental tobacco smoke.
 - Reduce or eliminate exposure to toxic metals such as lead, mercury and arsenic, to fluoride, and to anthropogenic hazards such as toxic wastes, pesticides and persistent organic pollutants.
 - Reduce or eliminate exposure to known and suspected anthropogenic carcinogens, neurotoxicants, developmental and reproductive toxicants, immunotoxicants and naturally occurring toxins.
 - Reduce the incidence of diarrhoeal disease through increased access to safe water and sanitation and promotion of initiatives to improve food safety.
 - Reduce the incidence of accidents, injuries and poisonings, as well as exposure to noise, radiation, microbiological and other factors by improving all environments where children spend time, in particular at home and at school.
 - Commit to international efforts to avert or slow global environmental changes, and also take action to lessen the vulnerability of populations to the impact of such changes.

- 2. HEALTH CARE AND RESEARCH – To promote the recognition, assessment and study of environmental factors that have an impact on the health and development of children:**
 - Establish centres to address issues related to children's environmental health.

- Develop and implement cooperative multidisciplinary research studies in association with centres of excellence, and promote the collection of harmonized data and their dissemination.
- Incorporate children's environmental health into the training for health care providers and other professionals, and promote the use of the environmental history.
- Seek financial and institutional support for research, data collection, education, intervention and prevention programmes.
- Develop risk assessment methods that take account of children as a special risk group.

3. EMPOWERMENT AND EDUCATION – To promote the education of children and parents about the importance of their physical environment and their participation in decisions that affect their lives, and to inform parents, teachers and caregivers and the community in general on the need and means to provide a safe, healthy and supportive environment to all children:

- Provide environmental health education through healthy schools and adult education initiatives.
- Incorporate lessons on health and the environment into all school curricula
- Empower children to identify potential risks and solutions.
- Impart environmental health expertise to educators, curriculum designers and school administrators.
- Create and disseminate to families and communities culturally relevant information about the special vulnerability of children to environmental threats and practical steps to protect children.
- Teach families and the community to identify environmental threats to their children, to adopt practices that will reduce risks of exposure and to work with local authorities and the private sector in developing prevention and intervention programmes.

4. ADVOCACY – To advocate and take action on the protection and promotion of children's environmental health at all levels, including political, administrative and community levels:

- Use lessons learned to prevent environmental illness in children, for example by promoting legislation for the removal of lead from all gasoline, paints, water pipes and ceramics, and for the provision of smoke-free environments in all public buildings.
- Sensitize decision-makers to the results of research studies and observations of community workers and primary health care providers that need to be accorded high priority to safeguard children's health.
- Promote environmental health policies that protect children.
- Raise the awareness of decision-makers and potential donors about known environmental threats to children's health and work with them and other stakeholders to allocate necessary resources to implement interventions.
- Work with the media to disseminate information on core children's environmental health issues and locally relevant environmental health problems and potential solutions.

For all those concerned about the environmental health of children, the time to translate knowledge into action is now.

Bangkok, 7 March 2002