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Impact on

Child Health

Dr. Cesar Chelala

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**PAN AMERICAN HEALTH ORGANIZATION**  
World Health Organization  
Division of Health and Environment

**Environmental**

**Impact on**

**Child Health**

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## PREFACE

Among the injustices in our world today, none is so alarming as the unequal treatment received by children exposed to health hazards in the environments in which they are growing.

The United Nations Convention on the Rights of the Child states categorically that children have the right to a healthy environment and to live in an environment that fosters their health and development. Unfortunately, we have a long way to go before children can enjoy this basic right. In Latin America and the Caribbean, 80,000 children die annually from causes that, for the most part, can be prevented with the resources and technology currently available.

According to the American Association of Poison Control Centers, 61% of poisoning cases that are not work-related occur in children under the age of 6, while 16% of deaths from pesticides occur in children. Moreover, the incidence and infant mortality rates for asthma and respiratory infections are increasingly troubling. An estimated 670 million children worldwide suffer from acute respiratory infections each year, and there is often a causal relationship between an unhealthy environment and these illnesses.

The number and variety of environmental risks that pose a hazard to child health are increasing steadily. Among these risks are food and drinking water contaminants, together with chemical substances suspended in the air or deposited in the soil and found in many everyday items.

There is a growing trend toward initiatives aimed at minimizing environmental risks and the exposure of children to harmful substances. Such initiatives are usually the work of individuals, families, civil society organizations, and government institutions at the central and local levels, and their results are increasingly visible.

The success achieved by several countries in reducing the burden of disease from environmental causes has led us to offer this publication, entitled *Environmental Impact on Child Health*, with the goal of securing greater support for the health and quality of life of children so that they can develop to their full potential.

*George A.O. Alleyne*

**DIRECTOR**

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## INTRODUCTION

Human beings are vulnerable to environmental risks from the moment of conception, during birth and their first years of life, childhood, adolescence, and ultimately, adulthood. However, due to many factors, including the fragility of their immune systems, their critical period of physical and mental growth and development, and their almost total dependence on adults, children are highly vulnerable to their surrounding environment. This not only has a significant impact on their health status, well-being, and future, but in an unfortunately high number of cases, their very survival.

"Environment" is understood as the physical, chemical, biological, social, cultural, and economic conditions with which human beings interact. In recent decades concern about the environment, the degree of knowledge about it, and the different ways in



which it can affect children's health have increased markedly. This is the result of new, more accessible information and research which indicates that, while in certain circumstances the environment can have an adverse impact on health, in many cases it can be reduced or even prevented when the proper steps are taken.

Currently, population growth, urbanization, and industrialization continue to increase, along with the economic and social gaps between different income groups. These disparities in income and resources mean that growing numbers of people are unable to protect themselves against adverse environmental effects, and it is they who suffer the harshest consequences. These people are not in a position to offer their children a safe and healthy environment, which at the very least means safe drinking water, clean air, basic sanitation, sufficient food untainted with contaminants, and adequate education, housing, and recreation.



## OBJECTIVES OF THE PUBLICATION

This publication, geared to the general public, emphasizes the importance of the environment for the healthy growth and development of children. Its purpose is not to provide an exhaustive analysis of the topic, but to outline the ways in which aspects of the environment can interact with and affect child health. We hope it will prove useful for health authorities, as well as political and community leaders, stimulating them to find solutions to their environmental problems.

## HEALTH FOR ALL?

Although life expectancy has increased significantly in recent decades, not all children will enjoy a longer life, owing to the quality of the environment into which they are born and grow up. In some of the less developed countries, more than 20% of children die before the age of 5, in marked contrast to the industrialized countries, where the figure is less than 1% (1).

These disparities cannot be attributed to genetic differences between the populations of the two types of countries, but undeniably reflect the influence of the environment that these children have had the good or bad luck to inherit. Children who are born and raised in healthy and stimulating environments, who receive good nutrition, and have easy access to safe drinking water and adequate sanitation have a clear advantage over those who do not. The inequalities observed between countries are also found within a single country—sometimes between adjacent regions and, most of all, between different social and economic groups.

Environmental risks differ in urban, peri-urban, and rural areas. While in urban areas the risks are attributable to rapid industrialization, motor vehicle accidents, stress, and violence, in peri-urban and rural areas they are more frequently associated with socioeconomic and cultural marginalization, with its higher unemployment, illiteracy, and barriers to health service access.

Health is an integral concept in which primary care, health promotion, and environmental education have multiplier effects that lead to greater well-being and a better quality of life, especially for children. This is why measures to improve hygiene and public health can have a greater impact on the health of populations than actions that are specifically medical in nature.



***The Convention on the Rights of the Child establishes all the rights of children, including: "...the right of the child to the enjoyment of the highest attainable standard of health...through the provision of adequate nutritious foods and clean drinking water ... and ... access to... hygiene and environmental sanitation ... and preventive health care...***

—United Nations 1989

## **ENVIRONMENTAL RISKS**

The environmental impact on human health may stem either from "traditional risks," which are normally associated with low levels of socioeconomic development, or "modern risks," which tend to be associated with development processes that damage the environment. The changing pattern of environmental risks that impact on health, characterized by a shift from traditional to modern risks as economic development progresses, is known as "the risk transition" (1).

The transition from traditional to modern risks may be affected by the emergence of new diseases (such as AIDS), the presence of diseases in areas where they have never existed (often as a result of a change in the environment), or the reemergence of diseases that were thought to be under control. An example of this latter phenomenon is the reemergence of tuberculosis in certain areas, due, among other things, to poverty, overcrowding, and resistance to the treatments commonly administered.

### ***Traditional Risks***

As a rule, traditional risks rapidly manifest themselves as disease. For example, if a child drinks contaminated water, there is a high probability that he will rapidly develop diarrhea; likewise, if the air in the home is highly contaminated, the child will undoubtedly soon suffer from respiratory problems.

Some of the traditional risks associated with poverty and underdevelopment are:

- Lack of access to drinking water
- Inadequate excreta and refuse disposal
- Unhealthy conditions in housing and the community
- Air pollution in the home from dust, fungi, and smoke from coal or other fossil fuels used in cooking or heating



*Persistent Organic Pollutants (POPs) are toxic compounds highly resistant to degradation that contaminate the air, food, water, and soil. They are introduced into the environment through industrial processes, the use of pesticides in agriculture and vector control, and the burning of fossil fuels.*

*According to estimates, several million tons are produced worldwide. For example, between 1941 and 1992 some 2 million tons of DDT were produced.*

*The effects of POPs on health include cancer, allergies and hypersensitivity, disorders of the central and autonomic nervous system, endocrine disorders, possible alteration of the immune system, and other problems linked with working conditions.*

—PAHO/HEP



- Food contaminated with pathogens
- Drinking water polluted with wastewater
- Natural disasters including droughts, floods, and earthquakes
- Lead contamination in housing from ceramics and paints
- Occupational accidents and diseases in agriculture, industry, and the informal sector (1).

### **Modern Risks**

A special characteristic of modern risks is that their harmful effects usually appear relatively long after exposure. Some of the carcinogens in pesticides, for example, may produce symptoms only after several years, and even then, it may be several decades before a sizable tumor appears (1).

Modern risks are associated with rapid development unaccompanied by mechanisms to protect health; they are also associated with excessive and unsustainable consumption of natural resources. Such risks include:

- Accumulation of hazardous solid waste,
- Air pollution from industry and vehicle emissions in urban areas,
- Pollution of water resources with industrial and agricultural waste and urban sewerage,

- Improper use of chemical or radioactive substances linked with new agricultural and industrial technologies,
- Traffic accidents,
- Emerging or reemerging infectious diseases,
- Climate and atmospheric changes, such as the thinning of the ozone layer and the greenhouse effect,
- Violence and the psychosocial effects of the urban environment,
- Smoking and drug abuse.

Clearly, the relationship between the environment and human health is highly complex, with a diversity of risks that can produce a great many harmful effects in people (1). These risks have frequently not been evaluated, since their numbers impede an exhaustive study of their impact on populations.

In the past 50 years an enormous amount of new chemical compounds have entered the marketplace. It is calculated that in the United States more than 70,000 chemical products are currently used in industry and consumer goods. There is no reliable information, however, on the health impact of almost two-thirds of these substances.

## **INTERACTION BETWEEN HUMAN BEINGS AND THE ENVIRONMENT**

Given the high degree of interaction between human beings and the environment, it can be said that the majority of diseases are in some way environmental diseases. Our bodies are in a constant and dynamic process of change and evolution as a result of their interaction with the environment. Some time ago, microbiologist and humanist René Dubos described this interrelationship in the following way:

*Any event in the outer world which impinges on an individual modifies, however indirectly and slightly, the balance between his*

*various organs and functions. In reality, therefore, the internal environment should not be considered apart from the external environment. Shivering or pallor, brought about either by exposure to cold or by a sudden fear, is but the outward manifestation of a physiological disturbance which may alter indirectly the performance of many essential body mechanisms... thus, the internal environment is constantly responding to the external environment, and history—racial, social, as well as individual—conditions the manner of response just as much as does the intrinsic nature of the stimulus (2).*

The intensity with which human beings are affected by environmental agents or situations depends on many factors, among them the degree of contact with them. The interaction between people and environmental contaminants is known as "exposure." Exposure can be completely harmless or result in clear damage to health.

In order to estimate the risk that an agent or substance can pose to health, it is necessary to know the degree of exposure and the dose/response relationship to that agent or substance. Emphasis is currently being placed on the distinction between "hazard" and "risk." In this context, "hazard" describes the potential for producing a health impairment, while "risk" is the quantitative calculation of the probability of causing harm based on the degree of exposure. Since children have more years of life ahead of them than adults do, they also have more time to develop chronic diseases produced by exposure to environmental contaminants (1).

The health of human beings depends on their capacity to develop a harmonious relationship with the environment. Thus, not only must the health impact of certain environmental agents be taken into account, but the actions necessary for maintaining the integrity of natural environments must also be considered.

The integrity of the global environment is being increasingly compromised by the deterioration in the ozone layer and ever-



higher concentrations of the gases responsible for the greenhouse effect and the probable global warming. It is believed that to the degree that these factors intensify, they will have a serious impact on the health of populations (3). While some of these negative effects will be direct—for example, the impact of rising temperatures on the quality of life of populations, or the rise in skin cancer resulting from the deterioration in the ozone layer—others will be indirect and probably even greater (3).

Some of these factors also have significant negative consequences for biodiversity, which will be one of the critical problems of the next millennium. Biodiversity is especially important because of the role that many species play as sources of food and drugs (3).

### ***Only a Healthy Environment Produces Healthy Children***

A healthy environment enables children to grow under conditions conducive to their optimal development and, in time, to become powerful agents for improving their environment. Although environmental problems affect all members of society, children reflect their impact the most because they are especially susceptible to pollution.

The existence of environmental contaminants does not in itself imply that they will produce a health impairment. Whether they do or not will depend on people's individual characteristics, among them their immune system, nutritional status, age, degree of mobility, and preexisting disease, as well as the length, manner, and



*From January to July 1991 more than 230,000 cases of cholera were recorded in Peru. One the factors that contributed to the severity of the epidemic was a phenomenon that put the authorities on the alert. It was called the "contagion factor" and referred to the spread of cholera in the public schools, where more than 5 million children and tens of thousands of teachers contracted the disease.*

*As a prevention measure, an effective school campaign called "Teaching without Cholera" was launched throughout the country. The campaign included information dissemination, training, and the construction of basic sanitation works, benefiting almost 263,000 school children countrywide. Some 836 sanitary modules were built in 757 educational centers, while 1,700 teachers received instruction in the proper use and maintenance of these services.*

—(CEPIS)

degree of exposure to the polluting substance. Unfortunately, people with physiological or socioeconomic characteristics that make them more vulnerable to environmental pollution are also those who are often in the worst position to avoid the problem (4).

Disease agents present in food and water are responsible for millions of diarrheal infections, particularly in children. This situation is aggravated by the degradation of soil and water resources, which hinders the capacity to produce adequate amounts of food of acceptable quality.

Nourishing food without harmful levels of contaminants is one of the basic requirements for healthy child development. Although there

is currently no scarcity of food at the global level or an inability to produce it in large quantities, not all people benefit equally from this situation. Most of the world's population still suffers from the lack of food or from infections or toxic reactions stemming from its contamination (5).

Other causes of a poor diet are famines caused by wars, displacement, or natural disasters. Malnutrition can cause pregnant women to give birth to premature or low birthweight babies, which can impair the physical and mental development of these children and the capacity of their immune systems to effectively respond to assaults by infectious agents (5).

Food contaminated with toxins produced by bacteria or pathogenic fungi is a serious health hazard. Several countries in Latin America recently experienced a resurgence of cholera, an epidemic that swiftly spread from country to country, resulting in thousands of deaths (6). Paradoxically—and fortunately—the steps taken to control cholera in many cases significantly reduced mortality from diarrheal infections, particularly in children (7).

Chemical residues from pesticide use are another important source of food contamination. Contamination can occur directly when these substances are sprayed on crops, or indirectly, when toxic metals and other substances used in pest control pollute the soil (5).

### **Healthy Spaces**

For children to grow and develop to their full potential they must have healthy environments and healthy spaces. The stimulation provided by games and learning—both formal and informal, at school and in the community—fostered through contact with their playmates is extremely important for a healthy life.

Children are especially susceptible to disease when they are born and develop in an environment characterized by overcrowding, poor hygiene, excessive noise, and a lack of space for recreation and study. They suffer not only from their hostile physical environment, but from the stress and other psychosocial factors (such as violence) that such environments create for them and their parents or caregivers. It is important to remember that children need to interact with their friends and peers, to explore and discover—all in an environment that affords them safety, consistency, and predictability (4).

The environmental, social, and economic situation in the home is, in turn, influenced by the general social, economic, and political situation. The rules, regulations, and laws governing a particular city or country will determine the priority that the government attaches to providing good services and an environment that promotes the health of the population. Within the general context, the economic situation is a key determinant in the decision, resolve, and capacity of the authorities to tackle environmental problems more effectively (8,9).

### **Poverty**

Poverty is one of the most important factors associated with disease in children, especially those living in urban environments. This problem is accentuated by the growing and increasingly





***During the first half of the 1990s, the Latin American countries with the lowest levels of poverty (Argentina, Chile, and Uruguay) managed to reduce the proportion and number of poor children.***

***In the countries with higher poverty indexes, in contrast, the proportion either remained stable (Mexico and Paraguay) or increased (Honduras and Venezuela).***

widespread economic and social disparities between society's different income groups.

It is well-known that the inequalities found in urban areas, in terms of resources and access to health services, put children from poor households at greater risk of dying from diarrheal and respiratory infections than children from middle- or upper-income households. Studies on the incidence of diseases related to the quality of the environment, such as tuberculosis and typhoid fever, reveal significant differences between poor and affluent areas (4,10,11).

Millions of people are currently living in absolute poverty, which has been defined as "living conditions so straitened by malnutrition, illiteracy, disease, squalid environments, high infant mortality, and low life expectancy that they are below any reasonable definition of human decency" (8).

The poverty problem is exacerbated by heavy migration from rural areas to the cities, where the huge waves of migrants overwhelm the existing social and health services. Migrant populations end up living in ramshackle settlements usually lacking in adequate water and sanitation services. Unfortunately, these slums, known as favelas in Brazil, ranchitos in Venezuela, villas miseria in Argentina, and pueblos jóvenes in Peru, are home to some 30% to 60% or more of the population in many cities in the developing countries (10).

## **BASIC REQUIREMENTS FOR A HEALTHY ENVIRONMENT**

Some of the prerequisites for a healthy environment are clean air, sufficient quantities of safe drinking water, and a global ecosystem that is adequate for human life (5).

### ***Air***

Air is so essential for life that we could not survive without it for more than a few minutes, and air pollution constitutes one of the most serious threats to health. An estimated 500 million people worldwide are exposed daily to highly contaminated air in the home, and more than 1.5 billion people live in urban areas with dangerously high levels of air pollution (5).

In many developing countries, air pollution in the home from the use of inefficient cooking or heating fuels is a very serious problem. These fuels, which produce smoke and leave residual particulate matter in the environment, can lead to countless health problems, among them respiratory disorders, allergies, eye problems, and even various types of cancer.

According to the "rule of a thousand," a contaminant released inside a dwelling is 1,000 times more likely to reach a person's lungs than when it is released outside. However, this problem is not confined to the developing countries. In the industrialized world,

some buildings that are hermetically sealed to conserve energy and take full advantage of central heating and air conditioning tend to accumulate chemical substances and microorganisms in their air ducts that circulate throughout the heating and cooling systems. In many of these buildings the situation is aggravated by inadequate air intake mechanisms to renew the air. Many of the chemicals and microorganisms circulated through these systems have a serious impact on people's health.

Modern industrial development is associated with the emission of gases and particulate matter that are responsible for air pollution. In this context, it is important to distinguish between mobile sources

of environmental pollution (vehicles) and stationary sources (industry) (5).

### **Water**

Water is no less essential than air for life, since a person cannot survive more than four days without it. The fact that throughout history towns and cities have traditionally grown up around lakes and rivers is a measure of how necessary this resource is.

The planet has a limited supply of fresh water that is distributed very unequally among the various regions and countries. Lack of water is one of the constraints to agricultural production and





### **CARBON MONOXIDE**

- Affects fetal growth and compromises organ and muscular development in children

### **NITROGEN DIOXIDE**

- Increases the possibility of contracting viral infections: lung irritation, bronchitis, and pneumonia

### **HYDROCARBONS**

- Irritate the eyes; cause fatigue and dizziness



**OZONE**

- Irritates the respiratory system; aggravates cardiac problems, asthma, bronchitis, and emphysema

**LEAD**

- Affects the circulatory, reproductive, nervous, and renal systems; causes hyperactivity in children, leading to learning difficulties

**SULPHUR DIOXIDE**

- Produces cough and affects the lungs

industrial development and is a significant determinant of the quality of life of a population (5).

The importance of safe drinking water to health is underscored by the fact that almost half the world's population suffers from some disease related either to the lack of water or water pollution. Water pollution is particularly serious in places where industrial effluents are not controlled or there are no sewerage and wastewater treatment plants (5).

It is calculated that almost one-quarter of the urban population in the developing countries lacks access to a source of drinking water located less than 200 meters from their dwelling. Another inequity can be seen in the volume of water that poor people consume in contrast to people with greater resources. In many cities, up to 80% of the water provided is consumed by 20% of the households. Poor households that are not connected to the public water supply consume an average of 15 to 20 liters of water per person per day, while households that are connected consume much higher amounts (8).

### ***A Healthy Ecosystem***

The term "ecosystem" refers to the relationship between organisms and their environment. Since a healthy ecosystem is closely linked to health, any alteration in that relationship will have a significant impact on the health of the population, especially children. The construction of roads and dams, deforestation, oil exploration and production, to give just a few examples, should not be permitted without a thorough assessment of their potential impact on health and the environment. This will ensure a harmonious relationship between human beings and the world around them.

## **REASONS FOR THE GREATER VULNERABILITY OF CHILDREN TO ENVIRONMENTAL RISK FACTORS**

It has been widely demonstrated that children are more susceptible than adults to environmental contamination, which affects their health and quality of life. Since they are still growing and their immune system and detoxification mechanisms are not fully developed, toxic or infectious agents in food, malnutrition, and air and water pollution generally have a more serious impact on them than on adults. Moreover, since children constitute almost half the population in many developing countries, such problems assume even greater importance (8).

### ***Conception and Intrauterine Development***

Numerous environmental factors put children at risk of contracting disease, from the time of conception, through their intrauterine development, birth, infancy, and adolescence—risks that continue into their adult life. These factors can actually exert an influence even prior to conception, since both ovules and sperm can be damaged by radiation or chemical contaminants (8).

The reproductive system of pregnant women is especially vulnerable to environmental contaminants. Each step in the reproductive process can be altered by toxic substances in the environment that increase the risk of abortion, birth defects, fetal growth retardation, and perinatal death (4).

The developing fetus is susceptible to environmental factors—for example, through the mother's exposure to toxic substances in the workplace. Furthermore, since fetal nutrition is entirely dependent on the mother, the most significant factors that affect the fetus are those that affect maternal nutrition and maternal health. Nutritional deficiencies in mothers (for example, a lack of vitamins or minerals) can increase the number of low-birthweight babies, who are at greater risk of dying during infancy (8).





***The mother's weight before and during pregnancy influences the new born's weight, which in turn defines the child's future health.***

—(Maternal Health: The Perennial Challenge)

Exposing pregnant women to chemical contaminants can affect intrauterine development. Although the placenta is an effective barrier against many substances, some toxic chemicals can pass through it and enter the blood of the fetus, sometimes reaching higher concentrations than in the mother. Some of these substances can even affect the fetus and not the mother (3).

Fetal sensitivity to different substances varies with the gestational age. It has been shown, for example, that in the first two weeks after conception, the embryo can be fatally damaged by toxic substances such as benzene, lead, or methyl mercury. Since pregnancy is normally detected after the third week following conception, death of the embryo before that time can escape notice (12).

Exposure to toxic substances between the third and ninth week of pregnancy can lead to severe malformations of the fetal organs, which at this stage have begun to develop. At least 3% of babies are born with birth defects, 10% to 15% of which are caused by exposure to environmental factors such as chemicals, radiation, viruses, and drugs (3).

Exposing pregnant women to high doses of radiation—x-rays, for example—can also have serious consequences for the fetus, particularly when the exposure occurs between the eighth and

the fifteenth week of pregnancy. During this period the cerebral cortex is developing, and it is particularly vulnerable to factors of this type, which can cause severe mental retardation (13).

### **Infancy**

In the initial stages of growth, when they are open to the world and revel in discovering its possibilities, children begin to be exposed to physical agents that are closely linked with the quality of their housing and their surrounding environment.

The effects of substances present in the environment are very marked during a child's infancy and subsequent growth. In many cases, the quality of the environment will determine to a great extent whether a child will survive its first year of life and how well it develops.

As proof of the importance of the environment during the first months of life, suffice it to observe that in populations that live in a clean environment free of toxic environmental influences, only 1 in 100 children dies before its first birthday. In societies or communities marked by poverty and inadequate health services, where the population is easily exposed to harmful environmental influences, as many as one in every two children may die before the age of 1 (3).

When the family and the community have no access to health services, and sanitary conditions are poor, children run a high risk of ingesting pathogens. If these same disadvantaged environments suffer from traffic congestion and overcrowding, it is very difficult to protect children from fire, scalding, poisoning, and accidents. These risks are much higher and more serious when both parents work and, as a result, children lack adequate supervision (3).

When infant formulas and semisolid foods are substituted for breast milk, a hazardous situation may also arise if there is no means for sanitary food preparation. Furthermore, in many societies girls suffer from greater exposure to environmental risks than boys since their nutritional and sanitary needs receive less attention.

However, even during breast-feeding, the risk of the mother's toxic exposure is possible when there are organic pesticide residues in the milk. These products, used intensively in agriculture, have a polluting capacity that is very hazardous to infant health (3). Some of these contaminants interfere with the immune system; thus, chronic exposure can have serious consequences for children's health.

***Asthma in children and adolescents has increased by more than 40% in the United States since 1980, affecting more than 42 million children under the age of 18.***

***Given the significantly higher incidence of this and other childhood illnesses, such as certain types of cancer, an intensive investigation is under way to determine the role of children's exposure to environmental contaminants in this phenomenon.***

—Bleyer AW. "What can be learned about childhood cancer." *Cancer Statistics Review* 1973-1988

Pesticides also pose a danger to children's health when they are used and stored in the home. A study conducted in the United States found that the victims of most pesticide poisoning were children under 6 years of age, who had ingested the substances in their homes (3). Children, moreover, can have allergic reactions to toxic chemicals and develop hyperactivity from dyes and other food additives.

In homes where fossil fuels are used for cooking, children are exposed to the additional risk of indoor air pollution. Furthermore, when other adverse conditions, such as malnutrition, are added to their exposure to contaminated air, children often develop respiratory infections that, if frequent, can lead to allergies, asthma, and other chronic lung diseases (14).

Another environmental hazard is lead, which when suspended in the air as particulate matter, can be absorbed in the blood and, even in relatively low concentrations, have an adverse impact on children's mental development. In fact, even low levels of lead in the blood can cause children (particularly those under 6) to display aggressive behavior, learning difficulties, hyperactivity, and other behavioral problems (15).

The sources of lead exposure fall into two groups: industrial and domestic. In the majority of Latin American and Caribbean countries, the main causes behind the rising levels of lead in children are the burgeoning traffic in the cities and the consequent air pollution from the use of leaded gasoline. The industrialized countries have drastically decreased or eliminated the use of leaded gasoline, which has been clearly reflected in the lead levels in the blood of the general population. Many developing countries, in contrast, still use gasoline with this additive.

The wide variety of household sources of lead poisoning make strategies for its control and prevention especially complex (16). The

principal sources of lead poisoning in the home are the use of ceramics made with clay and glazes containing lead, the consumption of water carried by lead pipes, and food stored in containers with lead welding (16).

In developing countries, poor nutritional status and substandard living conditions heighten the negative effects of exposure to lead. Although there are drugs that boost the capacity of the human organism to eliminate lead, they are expensive and produce serious side effects. As a result, perhaps the only strategy to eliminate lead poisoning is prevention—that is, stopping ingestion of the metal before it occurs (15).

Hence the importance of raising awareness among health authorities about the dangers and severity of the impact of lead exposure in children. This requires careful monitoring of the levels of this metal, particularly in at-risk children, as well as training for pediatricians and general practitioners in detecting the symptoms, signs, and effects of lead poisoning (16).

Regarding exposure to lead and pesticides, children are the most vulnerable population, because they absorb these substances more easily than adults, and their kidneys have greater difficulty in eliminating them. Furthermore, in the case of pesticides, children absorb proportionately more of these compounds, due to their higher intake of contaminated fruits and vegetables in relation to their bodyweight (17).

### **Older children**

The environmental risks mentioned above affect not only the health of younger children, but that of older children as well—that is, children between the ages of 5 and 14—even though, at this stage their immune systems are more developed and they have been vaccinated against the most frequent childhood illnesses. They will continue to be vulnerable to diseases caused by pathogenic agents,

as well as household contaminants and pesticides. In addition, children are subject to illnesses caused by greater mobility and, in the case of disadvantaged populations, early participation in the workforce, which entails health risks (3.5).

Schoolchildren in impoverished rural areas often attend schools lacking even the most basic sanitary facilities—bathrooms, for example. As a result, many children must share poorly maintained latrines, where the potential for contracting parasitic infections or infectious diseases is very high.

Accidents—especially motor vehicle accidents—are a public health problem that is steadily on the rise, while violence is an increasingly important cause of morbidity and mortality. Girls fall victim to accidents and homicide in lower proportions than boys. Violence may come to represent one of the most significant causes of mortality among boys between the ages of 5 to 14 (18).

### **Working Children**

In many countries, chiefly the developing countries, boys actively participate in the workforce. While there are no reliable statistics on the number of boys who work, the available data suggest that the numbers are very high. The proportion of children who work has traditionally been higher in rural areas, where nine out of ten working children labor in agriculture or related activities. In the cities of the developing countries, children

***Hazardous substances that affect the health of children are widely found throughout the Region of the Americas. A study conducted in Mexico City revealed that more than 25% of newborns had levels of lead in their blood that were high enough to have serious implications for their physical and neurological development. The sources of the lead that children ingest vary with the time, region, country, and group of children under study.***





***It has been shown that children and adolescents who work as garbage pickers in refuse dumps have higher school dropout, pregnancy, and drug abuse rates. There are families in Brazil that have already reached the third generation in this activity—that is, that were born, grew up, and raised their children as garbage pickers.***

—(Program "Refuse and Citizenship"  
UNICEF - BRAZIL/ Oct.1998)

are mainly employed in the informal sector, services and, to a lesser extent, the manufacturing industry. Although the majority of the countries of the Americas have legislation prohibiting child labor, the laws are not always obeyed, and children are often coerced into working and then exploited.

Worldwide, some 80 million children between the ages of 10 and 14 toil under conditions and working hours that compromise their normal physical and mental development. This harm comes not only from their exposure to substances and situations that are damaging to their health, but from their inability to attend school on a regular basis or the need to drop out when they are forced to earn a living. It is estimated that more than 15 million boys and girls in Latin America are employed, half of them between the ages of 6 and 14. Although relatively fewer girls are employed, they usually work longer hours (3).

"Small, weak, and inexperienced workers are at greater risk from the machinery and hazardous materials, heavy loads, and high temperatures associated with industrial processes; they are also more susceptible to chemical poisoning and to the respiratory problems caused by substances present in the air" (19).

***Emphasizing the potential harm caused by children's exposure to lead in the environment, Dr. George A.O. Alleyne, Director of PAHO, has pointed out that the lead in old paint, old houses, and gasoline, and the high levels of airborne lead will compromise the educational development of children in the future.***

An eloquent example of the child labor situation can be found in the shoe industry in Novo Hamburg, Brazil, where some 30 large factories and 170 smaller ones employ around 35,000 people, 12,000 of whom are children. These factories use benzene-based solvents, whose fumes remain in the environment when there is inadequate ventilation, adversely affecting the children who work there. Equally harmful is the work performed by children in mines and refuse dumps, as documented in Brazil, Colombia, Peru, and Mexico (3,8,20).

### ***Children in Difficult Circumstances***

Millions of children are the victims of physical, psychological, and sexual abuse, abandonment, and the ravages of war or natural disasters. These extremely difficult circumstances, of course, expose them to environmental hazards that jeopardize their health, some of which are violence, sexually transmitted diseases (STD), drugs, harsh weather conditions, malnutrition, and infectious and parasitic diseases (3.11).

Working children and street children are vulnerable to numerous environmental factors related to the type of relationship they have with their parents and families, where they live, and the type of work they do. The estimates of the total number of street children (some several million) vary widely, due to the lack of consistent, reliable data, the definition of "street children" employed, the high mobility of these children, and the special interests of the agencies and governments that generate and publish these statistics.

The health needs of these children pose a serious challenge for political and health leaders. As architect Ximena de la Barra points out, "Being poor is in itself a health hazard; worse, however, is being urban and poor. Much worse is being poor, urban, and a child. But worst of all is being a street child in an urban environment." (21).

Among the actions that can be adopted to reduce child labor are informing the public about exploitative child labor practices and encouraging governments to issue child labor policies based on international standards of respect for boys and girls.

### **PARENTS AT RISK AND THE IMPACT ON THEIR CHILDREN**

The health and physical and mental development of children depend largely on the capacity of parents to provide them with a family environment that is safe, stimulating, and insofar as possible, free of environmental risks. Of course, when parents themselves are at risk, it is difficult for them to offer that environment to their children (3).

The quality of a child's environment is also directly influenced by the mental health of its parents. When the environment is very stressful, children suffer. Furthermore, it has been demonstrated that a bad physical environment contributes significantly to abusive behavior on the part of parents (22).



## ***RIO GIVES ITS STREET CHILDREN AN IDENTITY***

***Selling peanuts in bars, begging at traffic lights, sniffing glue, or stealing purses, the street children of Rio de Janeiro seem to be everywhere. No one knows how many there are, because few have the basic documents of Brazilian citizenship, such as a birth certificate or personal identification card. Many of them die as anonymously as they live.***

***"We have always had conflicting numbers about how many children live on the streets [but the figure could be] anywhere from 300 to 3 million. However, the enigma is being solved, thanks to a new project. Some 40 psychology students, paramedics, photographers, and other volunteers have conducted the first census of the street children of Rio de Janeiro.***

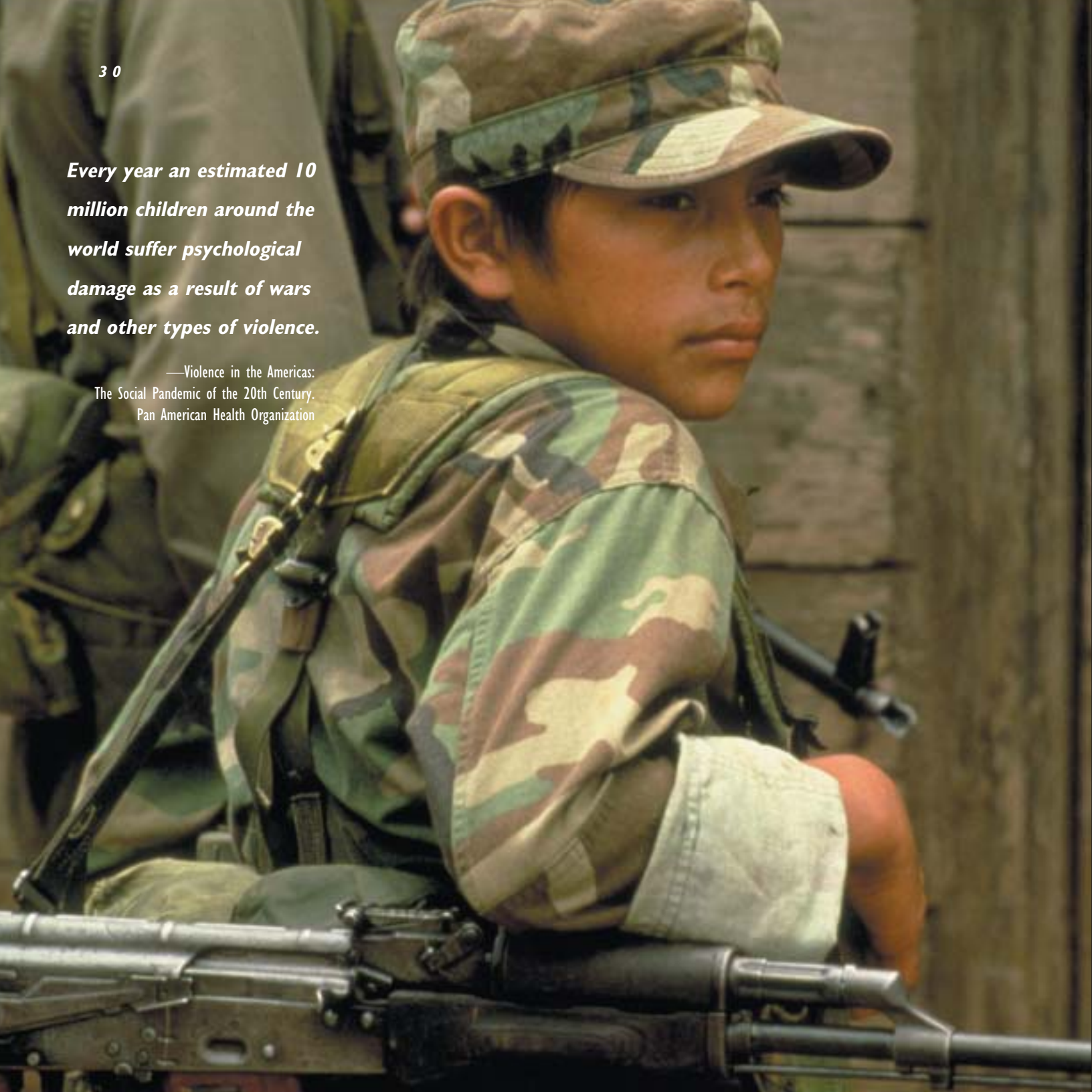
***For several months, the interviewers pounded the pavement, talking with the children, taking pictures and fingerprints and giving nearly a thousand of them a special identity card. "I am very happy with my card, I feel secure" said a 13-year old boy. The 932 children who have been registered perhaps approach the real number of those living on the streets, but this does not mean that the project is over.***

***Among the results it was found that almost all of the registered children had at least one living parent, and nearly two-thirds had two living parents. The goal is to get the family to take responsibility for its children, so the volunteers are now trying to locate these parents and take them to juvenile court for a series of compulsory courses on personal hygiene, family planning, and information about the criminal code and social services. "We will not change the situation by changing a law. We will have to change an entire culture."***

—(by Michael Astor / Associated Press Writer)

*Every year an estimated 10 million children around the world suffer psychological damage as a result of wars and other types of violence.*

—Violence in the Americas:  
The Social Pandemic of the 20th Century.  
Pan American Health Organization



## LIFESTYLES AND ENVIRONMENTAL HEALTH

### *The Many Causes of Environmental Illnesses*

Probably since the end of the eighteenth century, when Edward Jenner pioneered vaccination to prevent smallpox, up to a few decades ago, one of the basic premises of medicine was that in time, a single cause for each disease would be found. More recently, however, epidemiological studies have revealed that the diseases that afflict human beings do not have a single cause but several causes that interact (23).

Our bodies have an ongoing, continuing relationship with the environment and are continually being affected by it. Chemical substances, radiation, and psychosocial stress are increasingly significant causes of diseases of importance to public health.

These factors complicate diseases caused by microorganisms or malnutrition caused by poverty or ignorance. Hence, one of the key challenges to modern public health is how to respond to these multiple causes of disease (23).

Under normal circumstances, our body is kept in good health by complex mechanisms that regulate it and maintain its equilibrium and immunity. The inability to respond to assaults by harmful elements in the environment translates into a variety of diseases or disorders. Remaining in good health, therefore, requires better knowledge of how the various environmental factors interact with our bodies and facilitate or alter the regulatory or immune mechanisms that normally keep us healthy (23).

### **Stress**

Although it is easier to verify the effects of chemical substances or radiation on the human organism, it is important to regard stress as a cause of disease and other disorders. In adults, for example, this is clearly the case with heart disease, gastrointestinal disorders, or alcohol and drug abuse.

One of the consequences of rapid urbanization in Latin America and the Caribbean is that, due to the budget cuts stemming from the economic crisis throughout the hemisphere, the capacity of the governments to offer the entire population essential education, health, employment, and environmental protection services has diminished. This has led to the creation of impoverished environments—that is, environments marked not only by material poverty but by cultural, social, and environmental deprivation as well.

Impoverished environments threaten the family and community structure that normally gives individuals (especially children) a sense of security and belonging. The absence of these basic conditions is a significant source of stress, which affects the most vulnerable groups, such as children. Psychological stress has been shown to increase the vulnerability of individuals to physical and mental illness (24).

## CHILDREN'S ASSOCIATION WITH ENVIRONMENTAL HEALTH

The environmental movement, which arose in the 1960s in Europe and the United States, has spread throughout the world and is having an impact on civil society in industrialized and developing countries alike. Although it was first a middle-class movement, people from all walks of life are now involved in it, and the movement is increasing awareness in all the countries about the responsibility and need to address the problems that cause environmental pollution. Children and adolescents are playing an ever-larger part in raising awareness about environmental issues and can become an important group for developing activities designed to find solutions (25).

The United Nations Conference on the Human Environment, held in Stockholm, Sweden in 1972, emphasized the importance of educating the public about environmental issues and enlisting citizen participation in activities aimed at addressing them. However, at that

conference citizens were regarded more as passive receivers of information than as agents that would actively participate in the search for solutions (25).

At the United Nations Conference on Environment and Development, held in Rio de Janeiro in 1992, there was insistence on emphasizing a positive connection between economic growth and the environment as the only path for sustainable development. In recent years, growing importance has been attached to the role of individuals acting in common in a participatory manner through involvement in the management of local environmental projects. Adopting this approach lays the foundation for action, placing special emphasis on analysis at the community level (25).

Now, on the threshold of a new century, many nations are reevaluating the use of their natural resources and at the same time questioning what rights and possibilities children have for involvement in environmental projects that will benefit them and future generations. More and more significance is being attached to the need to involve children in the identification of problems and the design of activities to promote the sustainable development of their communities (3).

### ***Schools as Centers for the Promotion of Environmental Care***

Schools, from the primary level on, are the natural and most effective area for promoting environmental care. However, it is not infrequent to find rural schools across the length and breadth of our hemisphere where children receive lessons in the classroom on elementary hygiene and environmental care while lacking the sanitary facilities that would enable them to apply that learning (26).

Schools need to be in close contact with the physical environment and community that surrounds them to gain a better understanding of the environment and its needs. Contact with the community should be made through the students, with outreach activities to tackle

environmental problems, and through their parents, with whom an ongoing, relationship should be maintained. It is by strengthening these ties that schools can become strategic centers for the sustainable environmental development of their communities (3).

Environmental education should be an integral part of the curricula and linked with other disciplines such as history, science, geography, biology, and art, that facilitate integration of the concept of environmental care (3).

## **EXAMPLES OF SUCCESSFUL PROJECTS INVOLVING THE PARTICIPATION OF CHILDREN**

### ***Andean Rural Education***

Some examples of activities to promote environmental quality are school horticultural projects and school vegetable gardens, in which the children are playing an increasingly active role. This is the case of the Andean Rural Education program in the Peruvian Andes, where from the age of 6, children participating in the program have a parcel of land where they cultivate a vegetable garden. Through this, they learn the value of the crops, discover which ones are best suited to the type of soil and environment in which they live, and their nutritional and economic value. They can then transfer that learning and experience to their own homes and share them with their parents, who, through their collaboration in this type of program, develop a closer and advantageous relationship with their children's school and teachers (3).

### ***New Schools***

At New Schools in Colombia, every year children design and carry out community environmental projects as part of their basic education. With costs only 10% higher than normal expenditures, these schools are a model for incorporating new, more dynamic structures that permit them to operate better and more democratically (25).



### ***The Working Child Program***

The Working Child Program of Ecuador is a national movement whose objective is to protect the rights of children. It consists of a national system of centers for working or at-risk children called "Alternative Spaces." These alternative spaces are located in poor urban neighborhoods and teach children to defend their rights. In 1993, this program selected the environment as its annual focus of work. It currently has more than 50,000 children involved in environmental projects in 21 provinces and 23 cities throughout the country.

In many cases, especially where children under 10 participate, this program selects achievable short-term projects and once the children gain experience, they are assigned more important projects. The children participate in the evaluation of their projects and, based on the results, can decide to make changes in the activities. It is through direct participation that children become interested in the environment, developing a sense of their abilities and a desire to communicate with other children, within an interactive, democratic framework.

### ***Ecoclubs***

An outstanding group of environmental activities in Latin America are the Ecoclubs, nongovernmental organizations made up basically of children and young people, who coordinate their activities with several community institutions to improve the quality of life of the population. As of April 1998, there were Ecoclubs in 42 localities in the various provinces of Argentina.

Ecoclubs give priority in their activities to encouraging the population to separate household waste at the site where it is produced. Among their successful projects are environmental education, waste treatment, urban tree-planting, organic vegetable gardens, and the use of alternative energy and technologies. These projects contribute to better utilization of resources, the curbing of

emissions, a reduction in harmful substances and noise pollution, and the development of technologies that do not damage the environment and that permit children and young people to be the architects of their own future.

## **OUTLOOK**

Since 1972, when the United Nations Conference on the Human Environment was held, there has been a very marked change in people's perception and attitudes, owing to greater knowledge about the advantages of living in a healthy environment and the dangers involved in the neglect and degradation of the natural environment, particularly for children (1,8,26,27).

Environmental problems are so complex that is virtually impossible to solve them with a unisectoral approach. That is why innovative strategies are needed to integrate the concepts of environmental health, community progress, and economic development, within a broad and sustainable participatory framework. Moreover, there is growing support for the idea that to achieve sustainable development at the global level, action must first be taken at the local level.

However, while local governments have a great deal of responsibility for ensuring safe and healthy environments, if they are to be more effective they must work actively with other government sectors, nongovernmental organizations, community and religious groups, and the private sector. The objective is to meet basic needs, improve the environment, and train communities to take the necessary action.

In order to promote the role of communities as agents of change, it is necessary to deal with and delve more deeply into the

decentralization processes, emphasizing environmental and health activities that entail broad community participation. There is a real need to develop local capacity to collect, systematize, and effectively utilize information on environmental health (27).

Reaching universal agreement on the causes of environmental problems and on what should be done to solve or minimize them is no easy task. Drastic solutions are easy to conceive, but difficult to implement. Nevertheless, it is possible to develop a series of actions that will have a positive impact on the environment. The popular slogan "Think globally, act locally" becomes especially important in this context.

Some of the actions that will have a positive impact on the environment and, hence, on the health of children, are the following:

- Expand basic sanitation coverage, chiefly drinking water and sanitation services.
- Control air pollution, promoting efficient energy use.
- Clean up polluted areas, restoring them to their original condition or at least to an acceptable state.
- Promote conservation activities, including the recycling of materials and efficient use of resources.
- Create and promote the use of alternative modes of transportation.
- Promote and facilitate the use of environmentally safe technologies in developing countries.
- Improve the living conditions of the more disadvantaged population groups, such as women and children.

- Promote the enactment and enforcement of strict environmental protection laws.
- Provide greater protection for the ecosystem to maintain biodiversity.
- Include environmental impact assessments in urban planning and the exploitation of natural resources.
- Accept that while risks are part of daily life, their negative impact can be minimized or eliminated through formal and informal education, as well as economic incentives (4,8).

All the actions mentioned above should involve children as key actors in changing and improving the environment. The examples of specific actions described in this publication demonstrate the effectiveness of such an approach, as well as the importance of schools in increasing environmental awareness among children, their teachers, and their families. Roger Hart, Director of the Children's Environments Research Group of the City University of New York points out that only through direct participation can children develop a true appreciation of democracy and a sense of their own capacity and responsibility for participating. The planning, design, monitoring, and management of the physical environment seem to offer ideal terrain for the practice of children's participation (25).

Securing and developing that participation is the great challenge for those interested in improving the health and quality of life not only of this generation, but future generations as well. Environmental care depends largely on the children of today, the leaders of tomorrow. ■

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