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18. EDUCATING INDIAN CHILDREN ABOUT THE IMPACT OF CLIMATE CHANGE ON HEALTH

There is increasing agreement that greenhouse gas emissions generated by human activity are responsible for global climate change (International Panel on Climate Change, 2007). There has been an observed 0.5°C rise in average global temperatures since the mid-1970s, a change that the international panel attributes partly to these anthropogenic emissions. It is also believed that these changes will have, in many parts of the world, adverse health effects ranging from heat-stroke and injury from extreme weather events to hunger and infectious diseases.

As Smith and Ezzati (2005) point out, societies tend to sweep environmental health problems out of the house and into the community during the first stages of development and then out from the community to the general global environment during later stages. This shifting of risk by the affluent has put the poor and vulnerable at the receiving end of the transmission. The rate of infectious diseases increases with malnourishment, lack of access to clean resources, indoor smoke, and unsafe sex and are thought to be intimately connected with age and sanitation. When health risks are analyzed according to mortality rates and age, as occurs with respect to the World Health Organization’s global burden of disease (Lopez, Mathers, Ezzati, Jamison, & Murray, 2006a), it becomes evident that rates of infectious diseases are often highest amongst the very young, and that mortality from such diseases is highest amongst infants and children below the age of five, even in developed countries. As countries address basic environmental and sanitation issues and infant mortality reduces, deaths from chronic diseases appear to take over. Deaths from unintended injury (accidents) and intentional violence appear to remain constant (Lopez, Mathers, Ezzati, Jamison, & Murray, 2006b).

Thus, if global warming causes extreme weather events or an increase in infectious disease-causing organisms and their vectors, it will be the very young (under five) and the vulnerable who are primarily affected. This situation will be amplified amongst those who do not have access to safe and clean resources, nutrition, and healthcare, a lack that is especially evident in the poor and developing countries. As McMichael, Woodruff, and Hales (2006) explain, health effects due to climate change have hitherto spanned mostly thermal stress, problems from extreme weather events, and infectious diseases, but there is now increasing evidence of a wider spectrum of health risks associated with the social, demographic, and economic disruptions of climate change. McMichael and colleagues emphasize that evidence of adverse health effects should strengthen
pre-emptive policies and guide priorities for planned adaptive strategies. Therefore, we need to focus on adaptation to climate change.

**EFFECTS ON HUMAN HEALTH**

Several diseases and threats to human health can be directly or indirectly attributed to climate change. Extreme temperatures can lead to loss of life, while climate-related disturbances in ecological systems, such as changes in the range of infective parasites, influence the incidence of serious infectious diseases. In addition, higher temperatures affect air and water quality, which may, in turn, be detrimental to human health. Human health is also strongly affected by social, political, economic, environmental, and technological factors, including urbanization, affluence, scientific developments, individual behavior, and individual vulnerability (e.g., genetic makeup, nutritional status, emotional wellbeing, age, gender, and economic status) (Environmental Protection Agency, 2010). Human beings are exposed to climate change through changing weather patterns (e.g., more intense and frequent extreme weather events), thermal stress, and infectious diseases. The extent to which human health is affected by climate change depends on:

- How much populations are exposed to climate change and its environmental consequences;
- The sensitivity of populations to that exposure; and
- The ability of affected systems and populations to adapt (World Health Organization, 2008).

India, which can be said to be somewhere in the middle of the development spectrum, is experiencing, with the re-emergence of pathogens due to climate change, a stage where non-communicable and lifestyle-related diseases along with communicable diseases are almost equally responsible for morbidity and mortality, posing a serious challenge. Vector-borne diseases, especially dengue infection, which was earlier restricted to urban areas, are now being widely reported in rural areas. Dengue infection has also spread to areas of the country where it was previously unknown (South Asia Voice, 2008). During 2009, many of India’s states began reporting widespread incidences of chikungunya, an insect-borne virus of the genus *Alphavirus*, which is transmitted to humans by the *Aedes* mosquito; this, after a long period in which the virus had not been evident. Malaria, which was thought to be controlled, is re-emerging in both rural and urban areas (Narain, 2009). Thus, the effects of climate change on health have already become an issue.

**CLIMATE AND HEALTH EDUCATION PACKAGE**

The Waste and Resource Management (WaRM) group of the Centre for Environmental Education (an Indian non-governmental organization) recently developed an interactive program designed to heighten students’ awareness of the impacts of climate change on human health. The team trialed the program with a group of 40 middle school (Class VIII) students. The program, which includes