

20. Environment and Human Health

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Abstract:

Environmental health is the public health field that monitors and addresses those physical, chemical, and biological factors that we might not have direct control over, but can impact our health anyway. Human health and the environment are inextricably linked at local, national and global scales. Exposure to environmental issues, such as pollution, climate change, extreme heat and poor water quality, can negatively impact human health and wellbeing. However, maintaining a healthy environment extends beyond controlling these hazards. Different populations and groups differ in their vulnerability to environmental degradation, climate change and extreme heat events, often as a result of age demographics and socio-economic inequalities that affect resilience. Many people often think of environmental health in terms of clean air and water, but natural environmental forces including Global warming and climate change have the potential to alter biological systems.

20.1 Introduction:

Fifty years ago, the World Health Organization (WHO) defined health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.” This definition should serve as a reminder that redefining the view of environmental health and the natural environment requires many shifts in thinking, as well as a willingness to pursue a diversity of approaches.

Advances in the field of environmental health have taught us much about human health hazards; for example, air pollution can cause respiratory disease, heavy metals can cause neurotoxicity, global climate change is likely to fuel the spread of infectious diseases. In many cases a combination of stresses caused by climate change as well as human activity represents a considerably greater threat than either climatic stresses or no climatic stresses alone. A particularly important example is coral reefs, which contain much of the ocean's biodiversity. Environmental health issues traditionally have been addressed at the international level within the context of such issues as ozone depletion, climate change, and biodiversity. Various countries have tried to address these issues through the multilateral process, such as multilateral agreements and commissions, bilateral assistance and cooperation, private sector investment, trade, the work of nongovernmental organizations, education, and training. These efforts can be profoundly effective, asserted Pomerance; witness the reductions in the emissions of chlorofluorocarbons achieved through legislation and transnational agreements in the 1970s. Industry, especially newer companies with the capacity to design "greener" manufacturing practices, has made some inroads into environmentally friendly production. But challenges remain in assuring a safe and healthful food supply.

The natural environment, broadly conceived, can also enhance health, for example, many pharmaceuticals are derived from plants and animals, providing a compelling argument for preserving biodiversity. In addition, contact with the natural world may be directly beneficial to health. If so, then the field of environmental health needs to extend beyond mere considerations of toxicity. There is a powerful connection between the variety of life on earth and our own well-being, for example, the contributions of natural products to the pharmacopoeia, research, and diagnostic tools, and as indicators of pollution-related disease.

Biological diversity also serves as a set of indicators of environmental change, for example, the study of endocrine-disrupting chemicals in wild species and the decline and disappearance of the world's amphibian species. An additional way in which biodiversity connects with human health is in reducing environmentally caused disease. There is an active field using biological systems, principally microbes, to clean up toxic waste problems in the environment, particularly PCBs, oil spills, and heavy metals. Biological systems increasingly are being seen as potential means of cleaning up the water supply through the restoration of watersheds.

20.2 Areas of Environmental Health:

Environmental health is one of the largest fields within public health because of the myriad ways external forces can impact how we eat, live, and grow. These forces can be about addressing our natural environment (as in the case for clean water or sanitation), but they can also be the consequence of human beings' actions—including societal norms. Healthy people 2030's environmental health objectives highlight six key areas that encompass the various ways environmental health is crucial to the health of communities.

- **Air Quality and Noise**
- **Water and Sanitation**

- **Toxic Substances and Hazardous Wastes**
- **Homes and Communities**
- **Environmental epidemiology**
- **Climate change and its effects on health**

20.2.1 Air Quality and Noise:

Air is non-negotiable for humans. Air Quality (AQI) Is a yardstick that runs from 0 to 500. The higher the AQI value, the greater the level of air pollution and the greater the health concern. For example, an AQI value of 50 or below represents good air quality, while an AQI value over 300 represents hazardous air quality. Household combustion devices, motor vehicles, industrial facilities and forest fires are common sources of air pollution. Pollutants of major public health concern include particulate matter, carbon monoxide, ozone, nitrogen dioxide and sulfur dioxide. Air pollution is one of the biggest public health issues we face globally, and it's getting worse. Most of the world's population live in places that exceed the World Health Organization's air quality guideline limits. Invisible particles penetrate cells and organs in our bodies – our lungs, heart, blood and brain. This leads to millions suffering with diseases like asthma, strokes, heart attacks, cancer and dementia. Babies, children, older people and those with existing health conditions are most severely affected by polluted air. 90% of deaths caused by air pollution are in low- and middle-income countries. Every year, millions of adults and children die prematurely. Over 7 million people die each year as a result of air pollution. It's the second leading cause of deaths from non-communicable diseases after smoking. People who breathe polluted air have a greater risk of developing respiratory or infectious diseases.

Environmental noise, and in particular road traffic noise, remains a major environmental problem affecting the health and well-being of millions of people. Long-term exposure to noise can cause a variety of health effects including annoyance, sleep disturbance, negative effects on the cardiovascular and metabolic system, as well as cognitive impairment in children. Many people don't realise noise pollution is an important problem, impacting human health, including theirs. Of course, there are many more premature deaths associated with air pollution than for noise. However, noise seems to have a larger impact on indicators related to quality of life and mental health. In fact, according to some World Health Organization (WHO) findings, noise is the second largest environmental cause of health problems, just after the impact of air pollution (particulate matter).

20.2.2 Water and Sanitation:

Contaminated water and poor sanitation are linked to transmission of diseases such as cholera, diarrhoea, dysentery, hepatitis A, typhoid and polio. Safe drinking-water, sanitation and hygiene are crucial to human health and well-being. Safe WASH is not only a prerequisite to health, but contributes to livelihoods, school attendance and dignity and helps to create resilient communities living in healthy environments.

Every year in developing countries, millions are suffering and dying due to hazardous sanitation conditions and unclean water. This can be prevented. Many developing countries lack in water and sanitation, as a result millions die every year.

Health plays a big factor in sanitation and water in developing countries. There are many inexpensive and effective alternatives to clean water and safe sanitation. Access to water and sanitation increased from 1990 to 2002. Many challenges and obstacles are existent. With every challenge there is a solution. The solution can only be overcome through technology, research, collaboration, and engineering problem solving for future.

According to the Centers for Disease Control and Prevention, an estimated 780 million people worldwide don't have access to safe drinking water, and a jaw-dropping 1.7 billion (or roughly a fifth of Earth's population) lack adequate sanitation services like clean bathrooms. The impact of this is staggering. An estimated 2,200 children die every day worldwide of diarrheal diseases linked to improper water and sanitation.

20.2.3 Toxic Substances and Hazardous Wastes:

Toxicology is the area of science devoted to understanding how chemicals and substances can affect people and their surroundings—is an important field in environmental health. Many of the materials needed to advance industries and technology, like heavy metals or even some plastics, can also hurt the human body and even lead to serious medical conditions.

Some hazardous substances produce toxic effects in humans or the environment after a single, episodic release. These toxic effects are referred to as the acute toxicity. Other hazardous substances produce toxic effects in humans or the environment after prolonged exposure to the substance, which is called chronic toxicity. Hazardous substances may irritate the skin or eyes, make it difficult to breathe, cause headaches and nausea, or result in other types of illness. Some hazardous substances can cause far more severe health effects, including:

- behavioral abnormalities,
- cancer,
- genetic mutations,
- physiological malfunctions (e.g., reproductive impairment, kidney failure, etc.),
- physical deformations, and
- birth defects.

Impacts on the environment can be just as devastating: killing organisms in a lake or river, destroying animals and plants in a contaminated area, causing major reproductive complications in animals, or otherwise limit the ability of an ecosystem to survive. Certain hazardous substances also have the potential to explode or cause a fire, threatening both animals and human populations.

EPA uses the acute and chronic toxicity of hazardous substances to guide different aspects of the emergency response. The toxicity of a hazardous substance are also used to establish its Superfund reportable quantities (RQs). If the substance is released into the environment with an amount equal to or greater than the RQ, the release must be reported to the federal government. This helps EPA respond to the release to protect human health and the environment from the adverse effects of that hazardous substance,

20.2.4 Homes and Communities:

We spend the bulk of our time at home, work, or school, so it's important that these places be safe with minimal hazards, as well as be conducive to a healthy lifestyle. When a neighbourhood has a lot of violence, for example, families might not go outside to exercise. When roads aren't properly maintained, it can result in more car crashes. An emerging field in this area of environmental health is that of food access. Many neighbourhoods do not have full-service grocery stores nearby. In their absence, residents often have to rely on convenience stores to buy their groceries. This can be expensive, but most importantly, it can mean fewer or poorer quality options for fresh fruits and vegetables—a vital part of a healthy diet. For families in these areas, it can be a struggle to make healthy choices, exacerbating existing health disparities for low-income and minority populations especially.

In an effort to offset the impact of these "food deserts," environmental health professionals are urging communities to establish public gardens where residents can grow and harvest their own fresh produce, improve access to public transportation to full-service grocery stores and farmers markets, and change zoning laws to incentivize retailers to offer healthy food options.

20.2.5 Environmental Epidemiology:

Environmental epidemiology is the study of the effect on human health of physical, biologic, and chemical factors in the external environment, broadly conceived. By examining specific populations or communities exposed to different ambient environments, it seeks to clarify the relationship between physical, biologic or chemical factors and human health.

Environmental epidemiology is one of the most important tools used in environmental management decision making owing to its capacity to assess and monitor environmental hazards in different settings and quantify their health impact on the population at risk.

20.2.6 Climate Change and Its Effects on Health:

Climate change impacts human health in both direct and indirect ways. Extreme heat waves, rising sea level, changes in precipitation resulting in flooding and droughts, and intense hurricanes can directly cause injury, illness, and even death. The effects of climate change can also indirectly affect health through alterations to the environment. For example, worsening air pollution levels can have negative impacts on respiratory and cardiovascular conditions. Changes in temperature and rainfall can alter the survival, distribution, and behavior of insects and other species that can lead to changes in infectious diseases. Increases in precipitation, storm surge, and sea temperature can lead to more water-related illnesses. Climate change can also affect food safety, exposing people to contaminated foods that can result in foodborne illnesses. In addition, climate change can affect mental health and well-being. Exposure to climate-related hazards can include biological, chemical, or physical stressors and can differ in time, locations, populations, and severity. These are referred to as exposure pathways. These threats can occur simultaneously, resulting in compounding health impacts.

20.3 Ways to Protect the Natural Environment:

In recent years have science and technology provided us with ways to measure the correlation between a healthy environment and a healthy body. A first step is to monitor the health of our local environment actively and continuously. A second step is to create outreach programs for educating individuals about environmental health issues such as water quality. A third step is to continue to address issues related to pollution. Extensive networks and partnerships among industries and between government and industry must be created to reduce waste by-products and minimize the health effects of pollution.

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