

The Influence of Environmental Factors on Human Biological Health

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Soumission : 17/03/2026

Acceptation : 19/08/2026

Publication : 20/08/2026

Abstract

Human biological health is influenced by a wide range of environmental factors, including air and water quality, climate, chemical exposure, noise, radiation, housing conditions, occupational environments, and access to safe food and sanitation. Environmental exposures can affect respiratory, cardiovascular, neurological, immune, endocrine, and reproductive systems. The effects depend on exposure intensity, duration, timing, individual susceptibility, and interactions among multiple environmental factors. This paper examines nine major dimensions of environmental influence on human biological health, including air pollution, water quality, climate change, chemical exposure, noise, radiation, occupational conditions, built environments, and environmental health protection.

Keywords

Environmental Health; Air Pollution; Water Quality; Climate Change; Chemical Exposure; Noise Pollution; Radiation; Occupational Health; Built Environment; Human Biology

Introduction

Humans are exposed to many environmental conditions throughout life. Air and water quality, climate, chemicals, noise, radiation, housing, workplaces, and sanitation can influence biological health.

Environmental effects depend on dose, duration, timing, route of exposure, and individual susceptibility. Multiple exposures may also interact.

Environmental health research therefore combines biology, epidemiology, toxicology, environmental science, and public health.

1. Air Pollution and Human Biological Health

Air pollution can expose people to particulate matter, ozone, nitrogen oxides, and other substances. Inhaled pollutants can contribute to respiratory and cardiovascular stress and systemic inflammation.

2. Water Quality and Health

Contaminated water can expose populations to pathogens, heavy metals, pesticides, and other substances. Safe drinking water and effective sanitation are fundamental to biological health.

3. Climate Change and Physiological Stress

Heat, changing rainfall, extreme weather, and other climate-related conditions can affect thermoregulation, infectious disease patterns, nutrition, and cardiovascular and respiratory health.

4. Chemical and Toxic Environmental Exposures

Environmental chemicals may affect endocrine, neurological, reproductive, immune, or metabolic systems depending on the substance and exposure conditions. Risk assessment considers toxicity, dose, duration, and susceptibility.

5. Noise Pollution and Human Physiology

Persistent or high-intensity noise can affect sleep, stress responses, cardiovascular function, and concentration. Reducing unnecessary environmental noise can support physiological well-being.

6. Radiation and Biological Effects

Ionizing radiation can damage DNA and increase the risk of biological effects at sufficient exposures. Non-ionizing radiation has different mechanisms and risk profiles and should be evaluated according to exposure type.

7. Occupational and Workplace Environmental Factors

Workplaces may expose individuals to dust, chemicals, heat, noise, vibration, biological agents, or ergonomic hazards. Appropriate controls can reduce occupational exposure and injury.

8. Built Environment and Human Health

Housing, transportation, green space, sanitation, and neighborhood design can influence physical activity, pollution exposure, thermal conditions, and access to health-supporting resources.

9. Environmental Protection and Preventive Health

Environmental protection includes pollution prevention, monitoring, regulation, safe water and sanitation, occupational controls, climate adaptation, and public awareness. Reducing exposure at the source is an important preventive approach.

Illustration

The following illustration summarizes the major biological relationships discussed in the paper.

THE INFLUENCE OF ENVIRONMENTAL FACTORS ON HUMAN BIOLOGICAL HEALTH

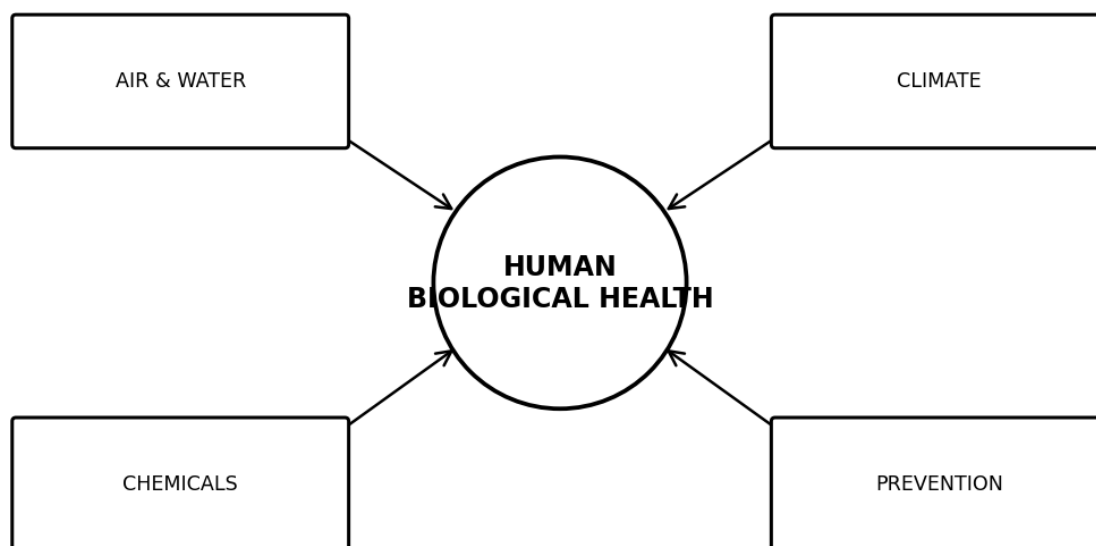


Figure 1. Simplified overview of the major biological processes and relationships.

Conclusion

Environmental factors can influence human biological health through effects on respiratory, cardiovascular, neurological, immune, endocrine, and other systems. Exposure risks depend on the type, dose, duration, and timing of environmental conditions.

Many environmental risks occur together, making integrated prevention important. Reducing pollution, improving water and sanitation, managing occupational exposures, and supporting healthy built environments can reduce biological risks.

Environmental health protection is therefore an important component of disease prevention and long-term human well-being.

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