

# Perspectives on Environment and Human Health: An Editorial

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## 1. Introduction

Human health and wellbeing are intimately linked to the state of the environment. Good quality natural environments provide clean air and water and fertile land for safe food production. On the other hand, degraded natural environments represent a potential pathway for human exposure to hazardous substances in the air, water and soil. Population groups who may be particularly exposed or susceptible to the effects of environmental exposures include those who work with and are exposed to agricultural chemicals; children, who receive proportionately larger doses of environmental toxins than adults; and workers and their communities exposed to toxic materials encountered during hazardous waste operations, mining, working, and living in polluted environments. While there is a growing understanding of the subtle and complex contribution of the environment to human health, the challenge remains of ensuring quality environments for all, including vulnerable groups.

While wellbeing is usually not the intended end goal of community gardens, it is known that participating in community gardening can positively influence wellbeing. Community gardens today are growing in importance in many cities of the world as they provide opportunities for food and income generation, as well as for urban residents to engage in outdoor physical and social activities [1]. With exposure to many metals in the general population (including children) occurring primarily through the diet [2], it is necessary to ensure that urban soils used to grow food are fit-for-purpose.

In polluted areas, the ingestion of contaminated water may be a significant pathway of exposure for many chemicals. Despite recent improvements, access to good quality drinking water remains a critical issue in many regions. According to the World Health Organization, in 2017, 2.2 billion people did not have access to improved drinking water sources [3]. Chemical pollution in particular is an ongoing concern, namely in low- and medium-income countries (LMICs). Exposure to chemicals in drinking water may lead to a range of chronic diseases (e.g., cancer and cardiovascular disease) and adverse reproductive outcomes and effects on children's health (e.g., neurodevelopment), among other health effects [4].

Numerous studies show higher levels of pollutants in indoor air than in outdoor air. With citizens spending more than 85–90% of their time indoors, indoor air degradation is a significant public health challenge. Exposure to indoor chemicals, particulate matter, dust and dampness, tobacco smoke, and various biological agents has been linked to

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increased prevalence of respiratory symptoms, allergies, and asthma, as well as perturbation of the immunological system [5].

Following environmental exposure, it can be appropriate to identify individuals who may be developing disease so that they benefit from early treatment, thereby reducing morbidity and mortality. Population screening programmes should have a critical role in the early detection of such disease. Although the concept of population screening is a simple one, implementing a screening programme often raises ethical, conceptual, and practical challenges [6]. Nevertheless, for some health conditions, usually of environmental origin, such as respiratory disease due to air pollution, virtually the entire population is susceptible; population screening in such situations is likely to be less important than prevention, which is pivotal in promoting health and preventing disease.

Overall, this Special Issue has a primary focus on chemical pollution. Chemical pollution is a large and growing global problem. The effects of chemical pollution on human health are poorly defined, and its contribution to the whole burden of disease is possibly underestimated [7]. Hence, new approaches are necessary to increase our understanding of the complex health–environment interactions. With a strong emphasis on chemical pollution, the papers published in this Special Issue provide relevant evidence on particular environmental issues influential to human health and well-being.

## 2. Content of the Special Issue

This Special Issue offers a broad spectrum of contributions, where different methodologies have been used to improve our understanding of interactions between humans, their health, and their environment.

The study areas include sites ranging from Europe to Africa, where environmental media such as soil, indoor dust, water, and ambient air are investigated for their hazardous substance content, such as lead and other potentially toxic elements, radon, or fluoride.

The Special Issue, composed of six manuscripts, covers three fundamental topics, highlighting different aspects of health–environment interactions: (i) the source–pathway–receptor approach, focusing on the different aspects that can influence human exposure; (ii) the hazard–exposure–disease pathway, focusing on population health screening practices in relation with pollution events; and (iii) environmental pollutants–tourism relationships, discussing tourist exposure to cadmium pollution and its geographical distribution patterns.

Entwistle et al. have detailed how the solid-phase fractionation of lead from selected urban agricultural soil samples can be utilised to interpret the bioaccessible fraction of this hazardous substance. In their study, the authors used a non-specific extraction system utilising chemometric data processing to measure the distribution of elements in the soil samples. Although the specific aim of the research was to better understand the geochemical controls on the bioaccessibility of lead in soils from urban allotment sites, their wider remit was to provide evidence on the need for regulators to consider the role of “aged” or non-labile lead in urban agricultural soils. With increasing concern over the health impacts of prolonged low-dose exposures to environmental lead, this study had an undeniable societal impact when providing greater confidence to regulators, in addition to the general gardening community.

The study from Marinho-Reis and co-authors focuses on the biogeochemistry of household dust. As in Entwistle et al., one of the aims was to investigate the effects of solid-phase distribution on element oral bioaccessibility. Since studies that have considered human contact with potentially toxic elements in household dust in the Portuguese context are limited, the authors further estimated the risks to human health following the unintentional ingestion of household dust. The results have suggested likely interactions between potentially toxic elements such as copper and the components of the solutions used to mimic human digestion, which calls for further research. The authors concluded by highlighting the need to increase awareness of indoor dust as a common exposure

pathway to environmental pollutants and provide information on how to reduce the tracking of potentially toxic elements from outdoors into the indoor environment.

The paper from Gevera et al. has addressed the major geochemical processes controlling the quality of water used for domestic and agricultural purposes in the central and southern parts of Makueni County, in the semi-arid south-eastern region of Kenya. The spatial distribution of the various physicochemical parameters, which delineates the different water quality zones for domestic and agricultural purposes, was obtained using geographic information system (GIS) technology. The study encloses baseline data required to make meaningful water management decisions for the region, especially given the high reliance on groundwater sources for domestic and agricultural purposes. The results obtained in this study led the researchers to propose a future survey planned to assess the health implications associated with local water consumption practices.

Further south, in the West Rand district of the Gauteng Province in South Africa, Moshupya et al. performed a study focusing on radon. The region is known for gold and uranium mining, which lasted for over a century. The abandoned tailings are exposed to the elements, leading to the dispersal of radioactive materials through wind and water. The primary purpose of this study was to understand the occurrence and distribution mechanism of radon gas in the West Rand region. The authors further aimed at investigating whether the radon gas could result in potential health effects, such as lung cancer, to the local population. Their findings highlighted the necessity of conducting a detailed epidemiological study to identify the linkages between radon and lung cancer.

In their review, Stewart and Wilkinson surveyed the literature for studies on health screening following environmental exposures. The goal was to identify good practices in the implementation or description of population health screening related to pollution situations, as determined by the application of recognized criteria. Identifying gaps in knowledge or practice was another topic of paramount importance in this review. The descriptive review of the published data formulated a series of recommendations for the wider public health community, encouraging contributions from toxicologists, epidemiologists, clinicians, policymakers, and environmental scientists. Environmental scientists understand the source–pathway–receptor approach to pollution situations that parallels the hazard–exposure–disease approaches that health professionals recognise.

The review from Mikhailenko and co-authors systematizes the literature available on the particular subject of environmental cadmium–tourism relationships. The environmental effects of tourism at local, national, and global scales are well known, and significant research has been conducted on the subject. Although Cd pollution and tourism seem to be far-standing issues, the authors argue that their relationships can be hypothesized. In the present study, the systematic approach used in the review enables the authors to identify current knowledge gaps and indicate probable trends for future research. Interesting are the geographical patterns of cadmium–tourism relationship studies, which, although apparently biased, were decisive in highlighting the global significance of the problem.

The papers published in this Special Issue highlight the need for integrated approaches that address complex and multi-causal health–environment interactions, implemented by health professionals and environmental scientists, to improve our knowledge about environmental factors influencing human health. With this knowledge, individuals and communities can make better decisions in and for their personal lives, and governments and regulatory agencies can improve their actions to minimise the adverse effects on their populations.

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