

# Can Environmental Health Play a Key Role in Prevention of Infectious Diseases?

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## Abstract

The warming of the climate and the increase in animal sources of infection due to changes in the natural environment, and the deterioration of air quality and unclean using water due to pollution are important environmental health factors that can influence the prevention of infectious diseases. In addition, excessive urbanisation development and over-production of food due to the global population explosion will also pose a significant challenge in terms of prevention measures for emerging infectious diseases. In conclusion, environmental health plays an important role in the prevention of infectious diseases and a multidisciplinary approach is an appropriate way to prevent infectious diseases.

**Keywords:** environmental factor, infectious disease, climate change, prevention, urbanization

Infectious diseases primarily drive global mortality and morbidity, which also contribute to the global burden of disease (Kirtane et al., 2021). Lower respiratory tract infections, diarrhoea, tuberculosis, human immunodeficiency virus infections and malaria are among the main contributors to the high global mortality from infectious diseases, particularly in developing countries (Kirtane et al., 2021). From the 19th century onwards, environmental health has been vital in public health research on infectious diseases (Feingold et al., 2010). Studies have shown a clear link between environmental changes and the spread of infectious diseases, meaning that environmental health-related precautions are essential in controlling infectious diseases (Eisenberg et al., 2007). The aim of this article is to analyse the critical role that environmental health plays in the prevention of infectious diseases. The reasons for this will be analysed regarding natural and social environmental health.

About 12.6 million people died from diseases caused by environmental risk factors in 2012, accounting for about 23% of global deaths, and the global burden of disease from this was about 22% (UN WHO, 2016). Changes in the natural environment, such as natural disasters and climate warming, can increase the spread of infectious diseases, so reducing changes in the natural environment and maintaining a healthy environment is beneficial in controlling infectious diseases (Kouadio et al., 2012). The natural environment has complex variations that affect the difficulty of preventing different types of infectious diseases.

Firstly, the issue of global warming due to excessive anthropogenic emissions of greenhouse gases is already affecting the elevated risk of infectious diseases worldwide (Ogden & Gachon, 2019). Environmental health factors contribute to 12% of parasitic and vector-borne diseases in children aged five and under (World Health Organization, 2017). For example, warming temperatures increase the risk of ticks and tick-borne diseases (TBDs) by lengthening the tick season. This is due to the environmental health risks associated with the continued increase in temperature and rainfall. Hence, a clear relationship between environmental change and

infectious disease is key to addressing this TBDs issue (Bouchard et al., 2019).

Secondly, air pollution may also be an environmental health factor affecting the spread of infectious diseases, such as acute lower respiratory infections (ALRI) caused by viruses (Horne et al., 2018). Environmental health factors contribute to as much as 32% of lower respiratory infections in children aged five and under, making it the disease most influenced by environmental factors (World Health Organization, 2017). Studies have shown that elevated exposure to PM<sub>2.5</sub> is associated with an increase in the number of ALRI visits and related healthcare use, thus suggesting that exposure to PM<sub>2.5</sub>, one of the most common air pollutants globally, is associated with morbidity and mortality from ALRI (Horne et al., 2018). In addition, PM<sub>2.5</sub> and smaller fine particle air pollutants have been identified as potential triggers of influenza and bacterial pneumonia in adults and children (Croft et al., 2018). For this reason, air quality is key to preventing respiratory-related infectious diseases.

Thirdly, food-borne and water-borne diseases are infectious diseases that are highly sensitive to environmental health factors (Cissé, 2019). 22% global contribution to diarrhoeal disease in children aged five years and under due to unclean water and food caused by environmental problems (World Health Organization, 2017). Water-borne infectious diseases are a significant cause of global mortality and morbidity, a challenge exacerbated by climate change, such as flooding, which may exacerbate the risk of transmission of infectious diseases through waterways (Cissé, 2019). Global health inequities exist because the burden of disease from food-borne infections caused by water safety issues is highest in Africa, while the burden of disease from water-borne infections is high even in high-income countries (Murphy et al., 2014). Water-related environmental health factors are therefore an important determinant of human health. Studies have shown that integrated water management as an effective environmental health preventive measure can reduce the health hazards of using contaminated water that may carry pathogens, disease-carrying insects or snails (Boelee et al., 2019). In addition, severe weather changes can lead to diseases in wildlife and domestic animals, which can further affect human health (Caminade et al., 2018). It follows that environmental health factors should be considered when developing health prevention strategies for infectious diseases to reduce environmental risks.

Social environmental health factors are also important factors in preventing infectious diseases and reducing the global burden of disease. Due to the rapid growth in the worldwide population and intense urbanisation, this represents a considerable challenge for the control of infectious diseases globally (Connolly et al., 2020). This is because substantial population movements can result in inadequate provision of public infrastructures such as water supply infrastructure and sanitation resources (Connolly et al., 2020). The impact of this social environmental health factor on infectious diseases is particularly evident in developing regions, for example, these less developed regions are often the source of major global outbreaks such as Ebola and SARS (Coker et al., 2011). Therefore, the two socio-environmental health factors, which are vigorous urbanisation and rapid global population growth, should be given priority consideration in the prevention of global infectious diseases. In order to meet the food need of a global population of over 11 billion people, a significant increase in the production of agriculture and animals is inevitable, and this has implications for the prevention and management of infectious diseases (Rohr et al., 2019). This is because the expansion of agriculture will increase the use of antibiotics, pesticides and fertilisers, thereby destroying animal habitats on a large scale (Rohr et al., 2019). This negative social environmental factor has a direct impact on human health, but also on the accelerated spread of infectious diseases and even the emergence of new infectious diseases due to the increased frequency of human contact with wild and domestic animals (Dobson & Foufopoulos, 2001). Therefore, the rapid expansion of agriculture as an environmental factor should also be considered when preventing the emergence of new infectious diseases.

Environmental health factors are one of the biggest killers since they can cause more than 80% of illnesses and injuries, however, if environmental risk factors were eliminated, up to 26% of adverse outcomes of death could be prevented (World Health Organization, 2017). The warming of the climate and the increase in animal sources of infection due to changes in the natural environment, and the deterioration of air quality and unclean using water due to pollution are important environmental health factors that can influence the prevention of infectious diseases. In addition, excessive urbanisation development and over-production of food due to the global population explosion will also pose a significant challenge in terms of prevention measures for emerging infectious diseases. In conclusion, environmental health plays an important role in the prevention of infectious diseases and a multidisciplinary approach is an appropriate way to prevent infectious diseases.

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