

# Public Health and Climate Change: Do We Need a More Proactive Approach?

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Nowadays, climate changes are a major concern for all of us. The actual data allows us to project a rise in the mean temperatures up to 5.8°C at the end of this century, and it is conceivable that extreme climate events will be even more common [1, 2] and one of the most important environmental threats in the 21st century.

Health may be affected directly through extreme temperatures, namely heat and cold waves, floods, storms and droughts [3]. It is also important to point out the high possibility of an increased frequency of water- and food-borne diseases and a change in the pattern of rodent- and vector-borne diseases [4]. Health may also be indirectly affected in many ways, not only by a methodological food production disruption, but also by a decrease in the food quality and an increase in the economic burden to guarantee availability and safety [5, 6].

Warmer temperatures increase the concentrations of air pollutants, and this signifies a health impact on the cardiovascular and respiratory systems [7]. Moreover, changes in temperature and rainfall patterns, particularly extreme events, might enhance the spread of infectious diseases. As far as the latter are concerned, it is important to remember the influence of temperature on the life cycle of some pathogenic agents and vectors, including their distribution [2, 4, 8]. Among others, diseases such as malaria, dengue fever and many diarrhoeal diseases are testament to this danger at a global level [9, 10]. Climate changes influence, for instance, the mosquitoes' distribution, such as that of *Aedes albopictus* and *Aedes aegypti*,

among others, and, as stated above, this will have an influence on the distribution profile of infectious diseases [11].

Additionally, the impact of climate change on mental health has been described but still needs to be fully understood to allow the implementation of preventive actions [12].

A rise in the number of natural disasters is to be expected and will certainly have a colossal impact on the population's health, particularly on mortality, but also on injuries, disabilities, diseases and emotional changes [10]. Examples of natural disasters are floods and hurricanes that may cause devastating situations, such as drowning and trauma with lives lost, risks related to water and food provision, changes in the distribution and concentration dynamics of vectors, as well as damage to material, including health infrastructure [3].

Additional effects of climate change, for example the rise of the mean sea level, may at some locations cause people's dislocation from coastal borders, with abandonment of their houses, to live at another, less dangerous place. These people are frequently called "climate refugees."

At the other end of the spectrum, we need to consider droughts. These are prolonged dry periods of time with a huge impact on the health of populations, leading to an increase in morbidity and mortality, malnutrition due to the scarcity of available food, risk of infectious and water-borne diseases, risks related to the agglomeration of displaced people, psychosocial stress as well as many other factors affecting mental health. Fires are also a frequent

result of droughts. They release several pollutants, such as respirable particulates and carbon monoxide, and may cause serious health problems. The respirable particulates can aggravate existing heart and lung diseases. Radiant heat and smoke inhalation may lead to severe injuries, including death, of directly exposed people, such as firefighters and the nearby population.

As far as emergent climate changes are concerned, heat and cold waves, excessive concentrations of ozone at ground level, accumulation of greenhouse gases, pollens and atmospheric pollution are relevant effects with a potential impact, for instance, on allergic diseases [8].

The accumulation of some industrial chemical substances in the atmosphere has impaired the stratosphere ozone layer. This layer is a natural barrier to UV rays that arrive on earth, and if this layer is impaired, there are high UV radiation levels [13].

Heatwaves, due to their increased frequency in recent times, need to be mentioned in particular. In fact, prolonged heat may lead to a higher mortality rate. A temperature of 1 °C above the threshold level may rise the mortality by about 2–5% [3, 13], depending on the exposure level (severity, frequency and duration) and on the sensitivity of the affected population. The thermal stress is worst in cities, because the “urban island effect” (rise in temperature of more than 5 °C), resulting from the use of surfaces that absorb the solar radiation more and the decrease of wind, causes an increase in ozone concentrations and suspended particulate matter. This will, of course, have an impact on citizens’ health [3, 14].

The concentration and distribution of pollens and other allergens also vary with climate change, leading to del-

terious effects on health, such as asthma and rhinitis. This is remarkable when there is an excessive heat wave [15]. The prevalence of allergies is associated with the season-related presence of atmospheric pollen and other allergens that may have adverse effects on health and, consequently, a potential impact on public health.

In the field of public health, climate changes will also have obvious repercussions on health services and health professionals [13]. Some regions with less health infrastructure will not be prepared and able to react when faced with the scenarios that can occur and have already been described [14, 16].

All populations are affected by climate change. However, some of them are more vulnerable than others, such as children, the elderly and people with cardiovascular, respiratory and oncological diseases and immunity disturbance. This emphasises the imperative need for the development of public health community-based programmes in view of climate change.

More accurate risk assessment, development of institutional partnerships, promotion of an appropriate risk communication that can improve risk perception, development of mainstream research concerning the interactions between climate change and health, and establishment of health services with the capacity to deal with the needs of clinical surveillance, epidemiological and laboratorial [17], are the course of action that cannot be delayed concerning the perspective of community-organized actions. For sure, climate change is an emerging threat that needs more attention. In our opinion, a public health perspective and intervention cannot be delayed.

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