Melting Ice and Malaria – The Tip of the Climate Change Iceberg?

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Editorial Review:

This is an ambitious article that gives a thorough overview of the key ways in which climate change will affect global health. It provides a useful grounding in the topic of climate change and health for those new to the subject. The author provides good evidenced based examples of future health scenarios in a warming planet. The style is succinct and readable with complex ideas explained without jargon.

Ramya Ravindrane (Guest Editor)

Keywords

Malaria, climate change, icebergs

Introduction

A line from the WHO report on climate change struck me particularly – 'Roman aristocrats retreated to hill resorts each summer to avoid malaria'. [1] Hoping to pursue a career in Tropical Medicine and Global Health, the climate crisis is one of my primary concerns for the future of global health – will there come a time when we spend our summer holidays hiding in the Pennines from infections at ground level? Being a medical student in London during the climate strikes it was inspiring to see people protest government inaction around preventing climate change - it is certain that climate change is having a measurable impact on global health and that it is time that we encourage awareness and act against it. I was personally inspired when a doctor in an MDT meeting made everyone pause to discuss climate change activism. By mentioning the effect of climate change on infection transmission and vectors, natural disasters, mental health, food security, productivity, and air pollution/allergies I will strive to explore the impact of climate change on global population health.

Natural disasters and Mental Health

It is reported that the number of weather-related disasters has tripled since the 1960s and had a disastrous impact on populations of developing countries. Rising sea levels destroy and displace populations and have a concrete impact on people's physical health (e.g. from trauma, disease, drought or famine) and the burden of mental health due to their displacement. [1] Floods not only contaminate drinking water and increase water borne diseases but cause direct physical impact on global health such as drownings and damage to healthcare provision systems. Following natural disasters, there is an increase in mental illness such as the levels of anxiety and PTSD shown following Hurricane Katrina.[2] There is a direct correlation between heat and exacerbation of existing mental health conditions - University of Maryland's Howard Centre for Investigative Journalism found emergency calls relating to psychiatric conditions increased about 40% in Baltimore in summer 2018 when temperatures were at a record high. [3] The mental health consequences of climate change range from anxiety and depression to suicidality. [4] Health risks continue to occur after an extreme event such as involvement in clean up or as a result of damage to property, loss of infrastructure, socioeconomic impacts and the degradation of the surrounding environment. [4]

Food and Productivity

Climate change is threatening our food security – as well as an increase in bacterial food poisoning cases due to rapid proliferation of bacteria in warmer climates, higher sea temperatures will lead to higher mercury concentrations in fish and contaminants from runoff will enter the soil we grow our plants in. [5] The yield of many of our farmed crops is predicted to decline because of the combined effects of changes in rainfall with increased competition from weeds.[2] The nutritional value of food may decline due to decreased nitrogen and therefore protein concentration in many plants due to elevated levels of carbon dioxide in the air. [2] Increased use of herbicides and rising food prices threaten the stability of health on a global scale with regards to the nutrition of the population and a potential further increase in malnutrition in developing countries.

Air pollution and allergen prevalence

Australia is burning! The headlines from the last month emphasise the recent and recurrent increase in wildfires, which are expected to increase in number and severity therefore contributing to climate change via smoke and other air pollutants. [5] Increased air temperature and carbon dioxide levels increase the suspension of airborne allergens triggering asthma exacerbations globally. There is an increase in particulate matter resulting from our burning of fossil fuels that is increasing our risk of lung cancer, chronic obstructive pulmonary disease and death as a population. [5] Ground level ozone is increasing and is associated particularly with decreased lung function – this is caused by increased temperature and methane emissions particularly. [2] Increased concentrations of carbon dioxide in the atmosphere can cause an increase in grass pollen which triggers allergies in around 20% of people – an ENT specialist commented that the overlap of seasonal allergens is increasing due to the changes in atmosphere and climate. [3]

The effect of climate change on vectors and infection transmission

Malaria is a public health concern and proven to be one of the most sensitive diseases to climate change – using modelling, the WHO showed that a temperature increase of 2-3 degrees Celsius would increase the number of people at risk of malaria by around 3-5% or several hundred million for context. [1] Climate change will affect infection transmission patterns and have catastrophic impact in already under-developed economies by decimating the workforce and causing unnecessary death – malaria, though treatable, is often unrecognised or the countries affected simply do not have the resources to - and therefore has a much larger impact in Sub-Saharan Africa than if it were to become a problem in a more developed country. The changes in climactic conditions will affect water and vector-borne diseases especially by lengthening the times of year during which disease is able to spread and when the vectors or organisms are plentiful and prevalent, and expanding the geographical areas affected such as for example a prediction of the area of China wherein schistosomiasis occurs increasing. [6] Mosquito vectors of malaria and dengue are sensitive to changes in climate and it is predicted that their prevalence will continue to increase with increases in heat and fluctuations in seasons [1]– the 'vectorial capacity', or ability to infect people, of the dengue virus reached a record high in 2016. [3] Climate changes increases the risk of water-borne illnesses with the increasing temperature causing altered and increased precipitation, rising sea levels, more frequent storms and subsequent runoff. This increases exposure to waterborne pathogens such as Giardia and increases the prevalence of diarrhoeal disease which has a huge toll on the population both in terms of lost productivity and unnecessary suffering. [2] A further problem is the melting permafrost uncovering potentially long dormant strains of for example anthrax, which could cause epidemics of such a scale that we cannot handle.

How to increase community participation in efforts to lower climate change?

The principal of tackling climate change, like many other public health concerns, is primarily to educate the public and not through the apocalyptic and alarmist narrative sometimes used unsuccessfully in the press. We must convince the public that, though a serious issue which is having catastrophic impact, there is still so much they can do within their daily lives to help tackle climate change - talking about solutions, and preparedness instead of talking about disaster – how can we protect our society from impending doom? Public health strategies must be developed at high level to make it easier for people to take positive and consistent action in their daily lives – a simple example would be, if meat consumption is having a negative impact on climate change but vegetables are expensive, to create means-tested government subsidies to alleviate this cost. Further to this, it is necessary to develop a clear strategy on climate change as a nation

with the implementation of community and school programmes around education and promoting awareness and action around climate change – this is something NGOs currently focus on, but the schemes must be nationalised to have a true effect. As scientists it is our duty to engage with communities and tackle misconceptions surrounding climate change.

Conclusion – WHO and who?

The key message in all of the areas that climate change is affecting, is that it is everybody on the planet's problem – it is affecting each one of us and therefore it is each individual's responsibility. Currently resource poor countries are the ones ravaged by natural disasters and we are far removed from their tragedy – but that should not mean that we by any means ignore their plight. Vulnerable groups are the 'who' that the WHO (world health organisation) is concerned amount – those of low income, certain races, immigrant groups, indigenous peoples, children and elderly, pregnant women, vulnerable occupational groups, disabled people and those with pre-existing or chronic conditions. As Greta Thunberg recently said 'I want you to feel the fear I feel every day. And then I want you to act. I want you to act as you would in a crisis. I want you to act as if our house is on fire.' which is fittingly true – the planet, all of our home, is on fire both literally and metaphorically, and this is having catastrophic implications for the health of our global population. There is definitely a shift is social attitudes, such as the concept of 'flight shaming' which is encouraging people to cut their emissions by flying less, towards a community where we are each able to make an individual and a community difference.

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