Heat waves: impacts and adaptation

Climate change is among the greatest risks for human health and a climate agreement is decisive to public health, as stated by WHO in COP21. WHO has also mentioned that climate change might cause an annual increase of 250,000 additional deaths worldwide in the period 2030-2050. The deaths caused by the 2003 European heat wave are a clear example of the consequences that climate change can have on the society if we fail to adapt in an appropriate way.

Together with her colleagues at BC3 and the Autonomous University of Madrid, in collaboration with the Institute Carlos III (Madrid) Chiabai has been analysing within the BASE FP7 project the measures and policies needed to adapt health systems as well as the associated costs and benefits for the society, and impacts in case of no policy action.

Health can be directly affected such as in the case of loss of life and injuries caused by flooding, but also indirectly as a consequence of increased risks of water contamination or deterioration of mental health resulting from material losses and displacement during such events.

In the case of heat waves, people are directly exposed to higher extreme temperatures which can cause thermal stresses (such as heat exhaustion or heat cramps), or exacerbate pre-existing cardiovascular and respiratory problems. Though all the population might be exposed, children, the elderly, urban poor, and people in poor health are usually the most vulnerable groups and represent therefore a special focus for targeted prevention and emergency response. Indirect effects are caused, on the other hand, by the impact of heat extremes on urban air pollution, which will act synergistically to aggravate health problems as the same drivers are behind these processes. Other indirect consequences include for example increased charges on public health and health care facilities with additional costs, impacts on agriculture, increased use of air conditioning and water, impacts on the ecosystems, among others. The highest impacts are expected in cities, especially in neighbourhoods characterised by poorly adapted buildings and without ventilation or air-cooling systems. In temperate countries, the heat-related mortality might be offset by a decrease in mortality due to cold waves during winter, though these results are still under discussion.

BASE research has highlighted the need to pay attention on the economic assessment of adaptation measures, using appropriate tools such as the cost-benefit or cost-effectiveness analysis. This has been recognized as an important pre-requisite in planning adaptation, together with the employment of local data on climate, health and population.

One of the case studies of BASE project analysed the long-term costs and benefits of heat watch warning systems in a local context such as that of the city of Madrid in Spain, characterised by intense episodes of heat waves and droughts during summer time. Warning systems are generally set up according to a critical temperature which is usually pre-identified according to some criteria, above which health impacts are expected to increase abnormally. In this respect, it is essential to consider local climate data and parameters to decide when the system should be activated. Physical acclimatisation plays a crucial role as people living for example in Oslo may be much more sensitive to lower temperatures than people living in Cape Town. Equally other factors such as demographic, behavioural, financial, technological and infrastructural parameters come into play. 'What is the proportion of elderly people in that city?', 'Do buildings have air-conditioning systems?' 'How urban planning is affecting the heat island effect?' ´Are people and vulnerable groups sufficiently informed?´ All these factors influence acclimatisation processes as people will be more or less exposed and/or prepared to face the impact. As a result, each city has to identify the appropriate threshold temperatures for sounding the alarm at different levels of risk, and there might be great geographical differences. Local factors should therefore be considered in the analysis and updated over time to take into account the evolution of climatic factors as well as all other social and technological components.

Role plaid by green infrastructures and lifestyle

Measures such as heat warning systems are specifically addressed to reduce health risks, while other measures are part of more comprehensive programmes with a wide range of inter-sectoral benefits. This is the case for example of green infrastructures in cities, such as green roofs or urban parks, which provide multiple positive outcomes. Apart from the expected health benefits associated with better air quality, less noise and heat island effect, improved mental health, reduced obesity due to more active lifestyle promotion, other benefits come from an improvement of urban ecosystem quality (biodiversity, carbon sequestration, water purification, etc.), or from social factors such as the

opportunity to reduce health inequalities or to develop a higher sense of community or cohesion within citizens, and finally to aesthetic values or recreational activities. Other examples of multiple benefit programmes could be represented by sustainable drainage systems, which reduce the impact of surface water drainage discharges and can provide meanwhile more a more pleasant environment.

As it was noted at the COP21 meeting in Paris – "investments in low-carbon development, clean renewable energy and greater climate resilience are also investments in better health". In this sense the health sector needs to collaborate with other sectors to produce integrated strategies for addressing climate change, thus contributing to the mitigation effort and to the transition to a low-carbon economy.

In this perspective, it is important to take into account a broader perspective when assessing adaptation and impacts of climate change. Economic indicators are important to set priorities given that decision-makers are usually constrained in their choices by budget limitations. However other factors are equally important to be considered, such as social inequalities, distributional effects among population groups, ethical issues, as well as synergies and trade-offs among sectors (to name a few), which can be taken into account engaging in participatory approaches where all social actors are involved to analyse the complexity characterising current urban systems.

Health policy

According to WHO, health adaptation is generally expected to provide benefits higher than the implementation costs and prompt action along this line will promote a higher population resilience in terms of health in face of future climate change impacts. Some of the measures been highlighted for the health sector include the improvement of disease surveillance, monitoring of disease development and exposure, improvement of preparedness plans and emergency response to extreme events such as heat waves, and collaboration between the health sector and other sectors. Efforts towards climate mitigation such as the reduction of air pollution, the promotion of active transportation and the reduction of animal consumption can bring important health co-benefits and significant cost savings for the health care system.

All in all, a central argument is how to plan adaptation in a way that is compatible with a transition to a low carbon economy, and promoting the necessary changes in lifestyles which will play a major role in future societal changes. Crucial points seem to include the

need for cross-sectoral collaboration with engagement of different social actors with multiple perspectives, integration among adaptation measures in different sectors, integration among local, national and regional scale agencies and institutions.

Aline Chiabai

Research Professor of Basque Centre of Climate Change