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Health consequences in the Mediterranean region

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Abstract

The Mediterranean basin is highly vulnerable to climate change, and a warming trend with changes in rainfall patterns with more heavy rains has already been observed. The frequency of dust storm and wildfire has also increased. Both non-communicable and communicable diseases will be seriously impacted by climate change since climate modification or air pollution influence the development of the former and weather conditions the latter. Different socio-economic characteristics within the Mediterranean basin will also exacerbate or on the contrary reduce health outcomes. Surprisingly few quantitative studies have explored the impacts of climate change on health in the Mediterranean region, and the few are geographically limited to specific areas of the basin.

Here we review the scientific literature on this topic and make some recommendations for the development of national and regional research, preparedness and adaptation policy in the Mediterranean region.

Résumé

La zone méditerranéenne est très exposée aux changements climatiques, et un réchauffement régional de la température avec une modification du régime des pluies, généralement plus fortes, est actuellement observé. Les tempêtes de sable et les incendies non contrôlés sont en augmentation. Les maladies infectieuses et chroniques humaines peuvent être affectées par ces bouleversements de façon directe ou indirecte ; les conditions bioclimatiques conditionnent le développement des agents pathogènes et de leurs hôtes vecteurs ou réservoirs ; les modifications du climat ou la pollution atmosphérique qui en dérive ont une influence sur le développement de certaines maladies chroniques. Des déterminants, en particulier socio-économiques, prévalant ou en évolution dans la zone méditerranéenne affecteront aussi la santé de la population. Curieusement, peu de travaux scientifiques ont étudié les effets des changements climatiques sur la santé humaine dans la région, et les quelques rares études restent géographiquement limitées à des zones particulières du bassin méditerranéen. Dans ce chapitre, nous synthétisons la recherche réalisée dans le domaine, et proposons des recommandations en termes de recherches scientifiques nationales et régionales, et de stratégies de préparation et d'adaptation à ce nouveau contexte.

Introduction

The consequences of global environmental changes for human health are among the top priorities of citizens worldwide. Climate change is one of many global environmental changes (land-use changes, ocean acidification, biodiversity loss, transcontinental trade and transportation, etc.), and there is ample evidence that it has already had significant effects on population health and additional consequences are expected in coming decades (McMichael et al. 2006, Costello et al. 2009). One of the critical issues is how and to what extent climate change, together with other associated environmental and social stressors, has consequences for the health of individuals and whole populations (Corvalan et al. 2005). Understanding such effects and possible interactions between different stressors is critical for effective public health decisions and strategies.

Climate change will have health effects worldwide, but here we focus on the Mediterranean region. Climate change has both direct and indirect effects on human health and both are relevant in this region. Direct effects include higher temperatures, increased UV irradiation and localized storms and floods. There is evidence that extreme temperatures are clearly associated with increased human mortality and morbidity, and recent findings show that heavy rainfall may accelerate the development of water-borne or vector-borne diseases. Indirect health effects are related to the deterioration of air, soil and water quality, which are expected to occur in the Mediterranean region. As an example, increased exposure to allergens, air pollution and infectious diseases that are related to climate change, will all significantly contribute to the increased frequency of respiratory diseases. Importantly, each of these indirect effects can also be triggered by other activities; for example, air quality is altered by climate change but also by industry, transportation, urbanization, etc. Concerning communicable diseases, many examples suggest a climate-driven cascade of effects model, notably a trophic one, for infectious disease outbreaks worldwide. Furthermore, interactions between climate change and the other stressors are very likely to take place and a major challenge will be to find out whether they act in an additive, synergistic or antagonistic manner. A major conclusion at this stage is that an assessment of the effects of climate change on health would be improved if it were combined with that of other environmental stressors (Flahault et al. 2015). Such an integrative approach is in line with the exposome concept and framework developed by Chris Wild from the IARC (Wild, 2005).

The duration and impact of heat waves are expected to increase with climate change. In a study on heat-related mortality rates in several European cities, Mediterranean cities including Barcelona, Rome and Valencia were found to be the most vulnerable to increased heat (Baccini et al. 2009). Similarly, the heat-related death rates in Lisbon are expected to increase significantly during the 21st century (Casimiro et al. 2006). It is expected that these adverse effects will primarily affect vulnerable individuals, notably the elderly, who are more likely to suffer from chronic diseases (Oudin Åström et al. 2015). Another likely consequence is the increase in exposure to UV with its consequences for skin cancers. Modifications in atmospheric pollutants including ozone are discussed in the following subchapters.

Changes in the precipitation patterns are also expected with increased risks of floods and droughts. They may differ from one region/country to the other (Messeri et al. 2015). In addition to their direct effect on health notably through mosquitoes able to transmit tropical infections, these changes will most likely impact agriculture and the food supply, as described elsewhere in this book. There is reason for concern that it may eventually lead to a change in the Mediterranean diet, which is among the strongest assets in terms of health for the inhabitants of this region. It would be extremely deleterious if climate change were to alter the balanced nutritional habits of the Mediterranean population. While plans should be proposed to prevent the consequences of climate change

in the Mediterranean area affecting diet, it is equally important to ensure the sustainability of the assets of this region, in particular food habits.

When examining the literature on climate change and health in the Mediterranean region, it is striking to see that very little work - a large proportion of existing literature consists of reviews and editorials, not original studies - has been carried out both on non-communicable and communicable diseases, and there are still many open questions (Hosking and Campbell-Lendrum, 2012). It is thus crucial to increase the number and quality of the studies and to highlight the importance of health effects in the future. It is also crucial that research is carried out not only in the northern part of the Mediterranean region but also on its southern and eastern rims. This will also contribute to a better awareness of the citizens of the prospects of climate change.

Climate change will affect the health of the Mediterranean populations both directly and indirectly. It should be included with other changes in population, migration and nutritional habits since the combination of those changes could lead to even more harmful conditions. We believe that if health concerns are highlighted by international bodies, the involvement of the citizens will be stronger and more sustainable. We also believe that the effects of all stressors and changes should be taken into consideration and integrated, and that the assets of the Mediterranean population, such as healthy diets, should be supported and advertised. In addition to preventive and precautionary actions, more research should be conducted to support national and trans-Mediterranean public health decisions.