

Interdisciplinary Regional Collaboration for Public Health Adaptation to Climate Change in the Eastern Mediterranean

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Public Health and Water Resources—Adaptation to Climate Change in the Eastern Mediterranean

What: A first workshop on climate change, health impacts, and adaptation over the eastern Mediterranean assembled scientists from six countries working on climate science, public health, and policy formulation and encouraged discussions and collaborations under the umbrella of the Regional Climate Change Adaptation Center (RCCAC) in the face of regional conflict.

When: 27–28 January 2020

Where: Trieste, Italy

<https://doi.org/10.1175/BAMS-D-20-0065.1>

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In final form 16 March 2020

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The World Health Organization has estimated that in 2012 approximately 23% of all deaths worldwide were attributed to changeable environmental factors, which may be potentially influenced by climate change (WHO 2016). In addition, the Lancet Commission on Health and Climate Change determined that “climate change could be the greatest public health threat of the twenty-first century” (Watts et al. 2015, 2017, 2018). There is clear evidence that climate change in the last 50 years has affected human health (e.g., Patz et al. 2005; Peretz et al. 2011; Mirsaiedi et al. 2016). Specifically, in the whole Mediterranean region, climate change leads to alterations in the mean, variability, seasonality, and extremes in one or more climatic variables, such as temperature, precipitation, humidity, and aerosols (Ulbrich et al. 2013), thus may influence the incidence of various climate sensitive diseases.

The Eastern Mediterranean is identified as a “hot spot” for climate change (Giorgi 2006). It is located on a transition zone between temperate climate in the north and semi-arid and arid climate in the south. As such, it can strongly be influenced in different ways by climate change, depending on the season and region. Some aspects of climate change in this vulnerable region include the following:

- 1) The length of the seasons, especially that of the rainy winter season versus the warm and dry summer. The duration of the summer season is expected to increase by 49% (~2 months), while the winter season may shorten by 56% (~2 months) toward the end of the twenty-first century (Hochman et al. 2018a). Summers are also expected to be much warmer than today (Giorgi and Lionello 2008) and thus to impact strongly public health as for example the summer of 2003 (Robine et al. 2008).
- 2) Heat waves are recognized as a major natural hazard causing premature mortality (e.g., Battisti and Naylor 2009; Bennett et al. 2014; Peterson et al. 2013). Heat waves are projected to increase in frequency, intensity, and persistence under global warming (e.g., Lelieveld et al. 2016). The Eastern Mediterranean has experienced extreme heat waves in recent decades (e.g., Kuglitsch et al. 2010) and will continue to experience such events in the twenty-first century (e.g., Hochman et al. 2018b).
- 3) Although the eastern Mediterranean is typically associated with warm weather and heat waves, it has also experienced damaging cold spells in recent years. Moreover, cold spells may not decrease as fast as may be naively expected under global warming, since variability may also increase (Kodra et al. 2011; Giorgi and Bi 2005; Gao et al. 2015). The changes in climate conditions may lead to substantial modifications in the timing and intensity

of seasonal health hazards, such as excess mortality from extreme events, vector-borne, and infectious diseases outbreaks.

The purpose of the workshop was to gain novel insights into what is to be expected in the region with respect to climate change and what responses and mitigation strategies are required from the various public health sectors.

Workshop

The introductory presentation set out the aims of the seminar and gave some examples for successful interdisciplinary regional collaborations (e.g., Hochman et al. 2020). The first half of the workshop was devoted to current developments and analysis of observed and projected climate change over the eastern Mediterranean. One important point made was that current climate change projections indicate that there will be significant changes in the relative length of summer and winter in the region in the coming decades, and that this will have health implications for the population. All studies with different downscaling approaches applied to the region agree in the tendency toward more extreme weather in the course of the twenty-first century (e.g., Samuels et al. 2017). The urgent need to make use of convection-permitting high-resolution modeling at seasonal/decadal scales to enable better predictions of the extent, intensity, and likelihood of extreme events such as heat waves and/or cold spells was stressed (e.g., Hochman et al. 2018c). While adequate representation of such high-impact weather events is not sufficiently well described by current models, high-quality and denser environmental observations are also required, especially in the currently sparsely monitored regions of the eastern Mediterranean. The proposed high-resolution simulations will provide more accurate predictions of climate change at the regional and local scales, which in turn can be used as inputs for epidemiological models. These modeling efforts may enable better prediction and understanding of the potential impacts climate change will have on public health in the region.

The second half of the workshop was devoted to discussions about the public health systems in Israel, Palestine, and Jordan. This included a detailed view of specific hazards, which are advancing, a fact that may be at least partially related to climate change. These include the spread of species hitherto not recorded in the eastern Mediterranean, such as the presence of leishmaniasis in areas of Palestine and Israel, where it was previously not found (e.g., Salah et al. 2020) and problems relating to the continuous rise in pollution caused by transport emissions (e.g., Nieuwenhuijsen and Khreis 2016). Public health and policy scientists stressed that climate change is expected to affect public health directly through physical influences such as extreme heat waves and cold spells (e.g., Peretz et al. 2011), and indirectly through the effect on chronic and infectious diseases. Furthermore, extreme weather conditions are known to increase the incidence of certain illnesses, such as cardiovascular and respiratory diseases, and climate change affects the occurrence and behavior of infectious and vector-borne diseases (e.g., Negev et al. 2015). The practical problems facing local health systems were also a subject of discussion, including underfunding, lack of preparation for dealing with climate-related illnesses, and the adverse effect of regional political conflict (e.g., Lange 2019).

Since the full effects of climate change on public health are currently not completely understood, recommendations in the public sector are still based on the allocation of resources for preparatory measures that will have a positive effect on public health, irrespective of climate change. These interventions include improvement in air quality, the construction of green neighborhoods, and support for healthy lifestyles. Recommendations call for real-time surveillance and coordinated response to extreme events alongside gradual changes in temperature and precipitation, which may lead to the outbreak of new diseases. In parallel, the recommendations call for strengthening the preparedness of the health systems in the region

through personnel training and distribution of information and guidelines to both employees and the public. At present, no practical measures have been specifically implemented for appropriate adaptation of the public health systems to climate change in the region.

Outcomes

From the workshop presentations and discussions, certain knowledge gaps were identified. These gaps mainly relate to the impact of climate change on the occurrence of infectious diseases and vector-borne diseases, and extreme weather-related mortality and morbidity. Very little research is currently available in this context, and scientists call for strengthening the database and research initiatives in these directions. Four main research questions immediately relevant for the eastern Mediterranean countries, under current and future changing climate conditions, were identified:

- 1) How heat waves and cold spells may influence mortality in the region?
- 2) How may the incidence rates and intensity of vector-borne diseases change?
- 3) How will the incidence rates and intensity of infectious diseases be affected?
- 4) How should policy measures change to cope with these effects?

The participants concluded that appropriate public health adaptation to climate change can only be properly met by real interdisciplinary regional collaborations. Indeed, learning from some of the economically more advanced countries already implementing interventions, such as Germany and Italy, may considerably speed up the process. The participants showed interest in pursuing the different scientific goals identified in the near future and will present their findings in subsequent workshops and to policy and decision-makers. It is anticipated that detailed projects will be developed, enabling relevant research to be undertaken, under the auspices of the Regional Climate Change Adaptation Center (RCCAC).

Acknowledgments. The workshop was made possible thanks to support from the Abdus Salam International Centre for Theoretical Physics, Trieste, Italy. A. Hochman and S. Helgert thank the Helmholtz Association for support. We thank Joaquim G. Pinto for comments on an earlier version of this manuscript. We would like to sincerely thank Mrs. Pandora Malchose as the local organizer. AH drafted the first version of the manuscript. This activity is part of a project funded by the European Union.

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