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Protect the vulnerable from extreme heat during the COVID-19 pandemic

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There is a considerable body of research studying how viruses, including some coronaviruses and influenza, are affected by weather, in which evidence suggests that their transmission may decline with higher humidity or temperatures. The spread of COVID-19 is changing rapidly and there are still many unknown factors that still need to be understood on how the virus is evolving, the dominant way of spreading and how these may different by geographical area or context. The evidence that has surfaced thus far on SARS-COV-2 has not conclusively determined whether the weather conditions will be a key modulating factor influencing the transmission of the virus (Bukhari & Jameel, 2020; Chen et al., 2020; Gunthe, Swain, Patra, & Amte, 2020; Gupta, Raghuwanshi, & Chanda, 2020; Liu et al., 2020; Luo et al., 2020; Ma et al., 2020; Şahin, 2020; Shi et al., 2020; Tobías & Molina, 2020; Tosepu et al., 2020; J. Wang, Tang, Feng, & Lv, 2020; M. Wang et al., 2020; Yao et al., 2020; Jüni et al., 2020).

However, as we approach the warm season in the Northern hemisphere still under a pandemic situation, there is reason for strong concern about a related cascade of impacts, namely how the pandemic may aggravate the health impacts of heat waves by hindering prevention efforts. Several health authorities at federal, national, subnational and local levels run prevention plans to respond to and reduce health impacts of heat. These plans, generically known as Heat-health Action Plans (WHO, 2008), typically comprise a series of interventions, including heat warning systems, advice and information on keeping safe from heat, specific outreach and care for vulnerable population groups, surveillance of heat-related mortality and illnesses, and local interventions to reduce heat exposure through cooling centers and cool recreational areas.

The physical distancing measures and common space use restrictions set in place by most countries in response to the COVID-19 pandemic may hamper the implementation of those core heat-health prevention activities and aggravate the population's vulnerability to extreme temperatures this summer. We will explore some possible unintended effects of such restrictions, using as a framework typical national/federal level Heat-Health Action Plans in Europe.

For example, the effectiveness and outreach of heat warnings and health protective advice could be diminished in a context of widespread health warnings and information related to COVID-19. Far from an academic digression, for vulnerable groups this is a life-or-death issue: thermal extremes (both heat and cold) are by far the deadliest climate exposure in Europe, well above storms and flooding for example (CRED, 2020). Extreme heat causes significant mortality in the region every summer, with periodical peaks; the summer heatwaves of 2003 killed over 70,000 (Fouillet et al., 2008) and the combination of heat and wildfire smoke killed over 55,000 in Russia in 2010 (Barriopedro, Fischer, Luterbacher, Trigo, & Garcia-Herrera, 2011). Yet the health risks of heat are systematically underestimated by the general public and even by those most vulnerable to them (Abrahamson et al., 2009; Akompab et al., 2013; Cuesta, van Loenhout, Colaço, & Guha-Sapir, 2017; Howe, Marlon, Wang, & Leiserowitz, 2019; Van Loenhout & Guha-Sapir, 2016; Bittner & Stößel, 2012). Adequate public health communication and media coverage should be ensured, and the language of heat-health warnings should thus reflect the seriousness of the risks posed by extreme heat, even in the current context of a pandemic. Warnings should integrate concomitant risk factors amidst the epidemic and heat, and ensure information on response measures and adaptation is clear even under lockdown or social distancing phases.

Similarly, the ability to reach out to and care for vulnerable people (e.g. living alone, chronically ill and the elderly) may be severely impaired in the current context of overwhelmed health and social care systems at every level. Adequate engagement of local governments and NGOs in heat-health action plans – still uncommon throughout the region- can help in protecting the most vulnerable against heat, by ensuring they are checked upon and can receive adequate care and support. This additional support may prove critical for residents and workers of institutions like nursing homes, which have been hit particularly hard by the pandemic. Access to necessary healthcare both at primary and specialized levels will continue to be restricted. In addition, fear of contracting COVID-19 may prevent some patients from seeking care even when experiencing heat-related symptoms, for example related to pre-existing conditions or interactions with medications.

Recent studies have shown that among COVID-19 patients the most prevalent comorbidities are hypertension, cardiovascular diseases, diabetes mellitus, chronic obstructive pulmonary disease (COPD), malignancy, and chronic kidney disease and cases with these comorbidities are more severe (Emami, Javanmardi, Pirbonyeh, & Akbari, 2020; Hu et al., 2020; Yang et al., 2020). These same chronic diseases are risk factors during heatwaves (Benmarhnia, Deguen, Kaufman, & Smargiassi, 2015). Further studies have shown higher COVID-19 mortality rates among the elderly and subjects with multi-chronic conditions (Shahid et al., 2020), thus making the European elderly population at an even greater risk this summer.

Rapid surveillance systems are a core component of heat plans and have been introduced throughout Europe in recent years not only to monitor the health impacts of heatwaves but are considered a strategic tool for an effective public health response (Martinez et al., 2019; WHO, 2008). Data from surveillance systems, especially mortality data, has also been called upon in the context of COVID-19 monitoring as they provide unbiased estimates not affected by case classification and can be useful to monitor containment and re-opening strategies (Leon et al., 2020). With the coming of high summer temperatures, it is vital that these systems are not entirely devoted to COVID-19 activity and still have the bandwidth to detect health impacts related to heat waves in order to ensure an adequate and timely response. Furthermore, when evaluating increases in mortality the potential role of both factors (heat and covid-19) on how one may affect the other or vice versa need to be studied in detail.

The use of publicly available air-conditioned spaces as cooling centers may not be compatible with the current directives mandating to maintain physical distance and avoid gathering indoors. In addition to the closure of public facilities like air-conditioned libraries, swimming pools and others, typical cool spaces like shopping malls and cafes may also be closed or restricted to various extents, even during the re-opening phases. Restrictions on publicly accessible cooled spaces will hit hardest those who can least afford air conditioning. Even for some households who may have been able to pay for the equipment and installation, running costs of AC are sometimes unaffordable. Lacking the options to access cooled spaces, residents without effective protection against heat may flock to cooler outdoor recreational areas including parks and water bodies. If not adequately managed, increased attendance in these spots could undermine the effectiveness of measures towards physical distancing and non-gathering.

If the decision of opening cooling centres is taken, users and staff will have to abide by a clear set of rules supported by an adequate physical setup (separation marks, printed instructions, banisters, etc.), supplies (hand disinfectant dispensers, face masks, etc.) and protocols (enhanced cleaning and disinfection, one-way walking, etc.). Since public transport may be restricted, ensuring the accessibility of cooled shelters will require complex logistics. Moreover, since some of the people who are at highest risk of severe outcomes from COVID-19 (for example, the elderly and the chronically ill) are also the most vulnerable to health risks from heat, gathering them in air conditioned spaces is potentially risky and should be done only if adequate space and facility setup can be guaranteed. One clear example of potentially risky gathering of vulnerable individuals in common air conditioned rooms are nursing homes and elderly residences. If no cooling protection through air conditioning can be provided to highly vulnerable patients, authorities may consider dispensing personal cooling devices, although their effectiveness has been thus far tested mainly on occupational settings, laboratory or healthy subjects (Rawal et al., 2020).

Additional common cooling solutions that should be reviewed for safety include mist sprayers (until more is known about the aerosol potential for transmission), public drinking water fountains that require manual operation (due to risk of surface contamination), and home visits by volunteer networks (in which asymptomatic infected volunteers may inadvertently put at risk vulnerable individuals). In some countries through various stages of lockdown, time slots for outdoor activity are being allocated by age groups and may not be correlated with vulnerability to heat. In general, both general procedures within Heat Health Action Plans and specific solutions for cooling should be reviewed and modified if necessary under the current situation.

Any decisions will inevitably will have to be made with limited information and plagued by uncertainty. In some instances, air conditioning may aid droplet transmission of the virus (Lu et al., 2020; Correia, Rodrigues, Gameiro da Silva, & Gonçalves, 2020) thus casting doubt on its safe use for groups. Seasonal patterns of mortality may change significantly, since there is reason to believe that COVID-19 related mortality will have decimated a proportion of the most vulnerable to heat before the summer season starts. Research has observed that high respiratory, cardiovascular and influenza mortality in winter leads to lower temperature effects in the following summer (Rocklöv, Forsberg, & Meister, 2009). Though several climate-influenced exposures (e.g. air pollution, allergenic pollen, heat) tend to occur concurrently (Linares, Martinez, Kendrovski, & Diaz, 2020), the current situation will further hinder the integration of prevention efforts, thus affecting their effectiveness and reach.

Finding and implementing solutions to these conundrums is urgent. In 2019, the annual temperature for Europe was the highest on record, and 11 of the 12 hottest years on record have all occurred since the year 2000 (ECMWF, 2020a). Some forecasts predict that 2020 may also be one of the hottest, if not the hottest, year on record (ECMWF, 2020b; NOAA National Centers for Environmental Information, 2020). This discussion will inevitably lead to hard choices with far-reaching consequences. The WHO has warned that failing to adapt the COVID-19 response to the prevention and management of Non-Communicable Disease risks (among which is heat) will mean failing many people precisely at a time when their vulnerability is heightened (Kluge et al., 2020). Thus, it is paramount that we plan ahead and make such choices with enough lead time, based on the available evidence, with equity and respect to fundamental rights, and according to agreed upon ethical principles. Importantly, there is still enough time to issue national-level guidance to be trickled down to local authorities, so that implementation is homogeneous and controlled. Leaving decisions on heat-health protection to municipalities and responders in the field without guidance can create heterogeneity in implementation, confusion in the public and ultimately additional harm.

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