Proportion of population vulnerable to heat exposure is rising globally

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The proportion of the global population vulnerable to heat-related death and disease is growing as a result of climate change's effects on growing populations of older people, people living in cities, and people with non-

communicable diseases (NCDs), according to the 2018 report of *The Lancet* Countdown on Health and Climate Change.

The rising vulnerability to the heat-related risks of climate change is mirrored by increased exposure to higher temperatures. Despite a mean global temperature increase of 0.3°C between 1986 and 2017, the average temperature increase people were exposed to was more than double this (0.8°C).

With the pace of climate change outweighing the urgency of the response, the report provides cause for concern. However, the authors also note promising trends in key areas for health, including the phase-out of coal, the deployment of healthier, cleaner modes of transport, and health system adaptation.

"Present day changes in heat waves and labour capacity provide early warning of the compounded and overwhelming impact on public health that is expected if temperatures continue to rise," says Professor Hilary Graham, The University of York, UK. "Trends in the impacts of climate change, exposures and vulnerabilities show unacceptably high risk for health now and in the future. The lack of progress in reducing emissions and building adaptive capacity threatens lives and health systems and must be addressed to avoid disruption to core public health infrastructure and overwhelming health services."

Professor Graham continues: "Despite delays, some sectors are embarking on a low-carbon transition, which is a promising sign. It is clear that the nature and scale of the response to climate change will be the determining factor in shaping the health of nations for centuries to come."

The annual report tracks 41 indicators across five areas: climate change impacts, exposures, and vulnerability; adaptation, planning, and

resilience for health; mitigation actions and health co-benefits; finance and economics; and public and political engagement.

The indicators include weather-related disasters, food security, clean fuel use, meat consumption, air pollution and the number of scientific research articles about climate and health. A full list of indicators is available in Panel 2 of the report.

It involves 27 leading academic institutions, the UN, and intergovernmental agencies from every continent, drawing on expertise from climate scientists, ecologists, mathematicians, geographers, engineers, energy, food, livestock, and transport experts, economists, social and political scientists, public health professionals, and doctors.

Health risks of heat exposure

As a result of increasing temperatures caused by climate change, vulnerable populations (adults over 65 years old, people living in cities, and people with cardiovascular diseases, diabetes, and chronic respiratory diseases) are exposed to heat stress, increasing their risk of cardiovascular disease, and kidney disease. In 2017, over 157 million vulnerable people over the age of 65 were exposed to heatwaves compared to the study's baseline, and 18 million more people compared to 2016.

Europe and the eastern Mediterranean are more vulnerable than Africa and southeast Asia, most likely due to ageing populations living in cities—42% of Europeans and 43% of people in the eastern Mediterranean are aged over 65 and vulnerable to heat exposure, compared with 38% in Africa and 34% in southeast Asia. However, as the prevalence of NCDs increases in low- and middle-income countries, the vulnerability of these populations also increases—particularly in southeast Asia where vulnerability to heat exposure has increased by

3.5% since 1990.

On average, each person was exposed to an additional 1.4 days of heatwave from 2000 to 2017, compared with 1986-2005.

Heat exposure and labour capacity

Rising temperatures are a risk in occupational health, and as temperatures regularly increase above physiological limits, sustained work becomes more difficult or impossible. In 2017, 153 billion hours of labour were lost due to heat exposure, an increase of 62 billion hours relative to 2000. In addition, these changes were concentrated in already vulnerable areas in India, southeast Asia, and sub-Saharan Africa, and South America.

Around 80% of these losses were in the agricultural sector (122 billion hours lost), 17.5% were in the industry sector (27 billion), and 2.5% were in the service sector (4 billion).

"Vulnerability to extreme heat has steadily increased around the world since 1990," says Professor Joacim Rocklöv, Umea University, Sweden. "This has led to vast losses for national economies and household budgets. At a time when national health budgets and health services face a growing epidemic of lifestyle diseases, continued delay in unlocking the potential health benefits of climate change mitigation is short-sighted and damaging for human health."

Rising temperatures and vector control

The authors demonstrate that small changes in temperature and rainfall can result in large changes in the transmission of important certain infectious diseases that are spread via water and mosquitoes.

In 2016, global vectorial capacity for the transmission of the dengue fever virus was the highest on record—rising by 9.1% above the 1950s baseline for the Aedes aegypti mosquito and by 11.1% for Aedes albopictus.

In addition, the cholera bacteria increased by 24% in the Baltic region's coastline between the 1980s and 2010s, while the vectorial capacity of malaria increased by 27.6% in the highlands of sub-Saharan Africa between the 1950s baseline and 2016.

Adaptation measures falling short

Globally, spending within the healthcare sector to adapt to climate change is estimated to have increased by 3.1% - from 4.6% of all adaptation spending (£11.32 billion) in 2015-16, to 4.8% (£11.68 billion) in 2016-17.

Over the same period, health-related spending (ie, spending in other areas such as disaster preparedness and agriculture) is estimated to have increased from 13.5% (£29 billion) to 15.2% (£32.65 billion).

The amount of adaptation funding falls short of the commitments made in the Paris Agreement, and only one health-focused project was approved in 2017. As a result, only 3.8% ($17.85 million of the $472.82 million) of the total 2017 adaptation spending for development was focused on health.

Regionally, Europe and southeast Asia increased their spending most, while low-income countries had much lower spending despite large increases. The authors warn that the total spending in low-income countries is still far too low to meet their needs.

More information: *The Lancet* (2018).