



## PRESS RELEASE

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### Heat exposure can affect hormones

*Singapore, 16 August 2024* – A multi-disciplinary team of researchers from the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine), University of Oxford, the London School of Hygiene & Tropical Medicine, and the William Harvey Research Institute (WHRI) at Queen Mary University of London, has stressed the urgent need for further research into the effects of heat exposure on the endocrine system. With climate change increasing seasonal temperatures and causing more heatwaves, understanding how extreme heat impacts our bodily functions and system has become more crucial than ever. This review was published in [Nature Reviews Endocrinology](#).

Hormones play a role in nearly all biological functions and key life stages, such as puberty, pregnancy, lactation and menopause, yet the influence of environmental factors on hormone release and action is not well-characterised. The review highlights the gap in evidence regarding the impact of sustained heat exposure on the endocrine system, by spotlighting a review of studies published from the 1940s onwards that involve the impact of short-term, heat exposure in pre-clinical models exposed to high temperatures on hormones required in processes ranging from the stress response, blood glucose control, fertility, and breast milk production.

Previous data suggested that foetal endocrine development could be affected by heat exposure, while its effect on girls and boys going through puberty is still unknown. Increased ambient temperatures have however been associated with a decreased level of ovarian follicles, which is associated with reduced fertility.

Additional areas of concern:

**Pregnant women** persistently exposed to high temperatures might have an increased risk of maternal complications such as gestational diabetes mellitus, and increased risks of preterm birth, stillbirth and low birthweight. During menopause, women undergo neuronal and hormonal changes that impair their thermoregulation which manifest as hot flushes that could be aggravated due to rising temperatures.

**Thyroid disorders and diabetes mellitus** fall under endocrine diseases that have the potential to cause maladaptive thermoregulatory responses. Thyroid disorders are associated with impaired thermoregulation, yet its consequences on heat exposure at the population level are largely unknown. Patients with diabetes mellitus are susceptible to water loss and dehydration, diabetes mellitus is also associated with decrease in skin blood flow and heat dissipation. In addition, patients with diabetes mellitus exposed to heat extremes have a higher likelihood of an increased cardiovascular event burden because of the risk factors involved.

In Singapore, the findings of the Third National Climate Change Study (V3) presented in January 2024, forecasted that very hot days will occur more frequently, with more warm nights where temperatures are expected to exceed 26.3 degree Celsius. Certain hormonal disorders can disrupt the body's ability to regulate temperature, making it harder to cool down and increasing the risk of heat-related illnesses. The shift in heat extremity would increase the risk of hospitalisation for these patients, which also increases the burden of heat on the health system. "We know very little about whether increased heat exposure due to climate change could affect endocrine health. We require research involving both the endocrine and global health research communities to assess the impact of rising temperatures and heatwaves on endocrine patients. This is particularly important for patients living in hot climates, who may have inadequate access to cooled environments. A better understanding of these effects will enable interventions to be developed for endocrine patients most at risk from heat extremes," said lead author, Professor Fadil Hannan from the Nuffield Department of Women's & Reproductive Health at the University of Oxford.

In the face of increasing heat extremities around the world, societies with more vulnerable populations face greater obstacles, especially when it comes to combatting the effects of heat. Co-author, Associate Professor Jason Lee, Director of the Heat Resilience and Performance Centre at NUS Medicine, adds, "As the world grapples with the escalating threats of climate change, unravelling the intricate relationships between heat exposure, endocrine function, and human health is not only a scientific imperative but a moral obligation on our part to protect the vulnerable and ensure the well-being of generations to come."

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Since the School's founding in 1905, more than 12,000 graduates have passed through our doors. In our pursuit of health for all, our strategic research programmes focus on innovative, cutting-edge biomedical research with collaborators around the world to deliver high impact solutions to benefit human lives. The School is the oldest institution of higher learning in the National University of Singapore and a founding institutional member of the National University Health System. It is one of the leading medical schools in Asia and ranks among the best in

the world (Times Higher Education World University Rankings 2024 by subject and the Quacquarelli Symonds (QS) World University Rankings by subject 2024).

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### **About Nuffield Department of Women's and Reproductive Health, University of Oxford**

The Nuffield Department of Women's & Reproductive Health (NDWRH) at the University of Oxford is a pioneering institution with a rich legacy dating back to 1937; and stands as a vanguard of excellence in perinatal research and clinical practice.

Our vision is clear: a world where everyone enjoys high-quality, evidence-based women's and reproductive healthcare. Through cutting-edge research and transformative teaching, we're committed to elevating the standard and accessibility of women's healthcare worldwide.

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