

Environmental warming and childhood kidney health

A growing public health concern

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EDITORIAL

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Nephrology has been slow to recognize climate change as a significant concern. Environmental warming subtly altering the natural course of kidney disease, and this change is particularly notable during fetal development and shortly after birth, when the kidneys are forming and are unable to regenerate.¹ Children are particularly vulnerable to heat due to their physiology. Compared to adults, they have a larger surface area relative to their body mass, sweat less effectively, and generate more metabolic heat during physical activity. Consequently, they rely entirely on adults to move them to shaded areas and provide water.^{2,3}

When ambient temperatures increase, Renal blood flow decreases, vasopressin levels rise, and the renin-angiotensin-aldosterone axis becomes activated.⁴ Acute kidney injury follows more readily than we like to admit; a substantial fraction of those hospitalized for heat illness sustain it. What has changed is not physiology but its frequency: the conditions that trigger these events now arrive more often, last longer, and reach places once spared.

Prenatal arguments are crucial. Nephron complement is fixed at birth and never replenished; it varies greatly among individuals and closely correlates with gestational age and birth weight. Pregnant women's problems are made worse by heat, drought, and post-flood infections. They are more vulnerable to dehydration, have poorer thermoregulation, and are frequently among the first to suffer from food insecurity and unsuccessful harvests. Preterm delivery and low birth weight are made more likely by these factors. Over the course of their lives, children who are born too small or too early have fewer nephrons. This is a blatant example of intergenerational harm. The kidneys are severely strained by global warming even before birth, and this strain persists throughout the ensuing decades because of heat and dehydration. As a result, a generation of people with impaired kidney function enters an environmentally stressful world.⁵

Furthermore, the damage is not limited to the nephron. Once a middle-aged condition reached, nephrolithiasis is now diagnosed in children and adolescents at an increasing rate; heat and long-term dehydration are likely contributing factors; stone disease has nearly tripled in the US since the 1970s.⁶ Nearly 1 in 10 people worldwide already suffer from chronic kidney disease, which is expected to rise to the fifth most common cause of death by 2050.⁷ Also in western Europe, CKD would become the third cause of death by 2050.⁸ Beneath those numbers lies a well-known injustice: the burden is concentrated in areas with the weakest health systems, limited cooling, and the lowest likelihood of a febrile, dehydrated child receiving care in a timely manner.

The solution is simply ignored; it is not difficult. Anyone who lives or works in the heat, regardless of age, should have access to water, shade, and rest. Pregnant women need protection, cooling, and proper hydration because their kidney health depends on their thermal safety. Keep an eye out for heat-related injuries in the clinic while they are still treatable, rather than waiting until irreversible fibrosis has set in. Additionally, a pediatric eye specialist is trained to interpret a preterm or small-for-gestational-age history as a lifetime renal risk factor rather than a resolved neonatal footnote. None of this is waiting for a breakthrough.⁷

It requires us to adopt a different viewpoint. For far too long, we have neglected the environment while tending to the failing kidneys that climatologists, planners, and environmental ministries gave us. One of the most significant renal risk factors for children is the thermometer on the ward wall, which is just as real as proteinuria or an increasing creatinine. A field that purports to safeguard the kidney throughout life cannot continue to act as though the climate deviates from that path. It's time to recognize the growing heat for what it is and act while our youngest patients are still able to defend themselves.

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