April 22, 2022

Statement on Climate Change

The American Society of Nephrology calls on kidney health professionals to take action to address the impact of climate change on the 850 million people—including more than 37 million Americans—living with kidney diseases across the world who are uniquely vulnerable to the effects of climate change.

State of climate science

Climate change—defined by the UN Framework Convention on Climate Change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere which is in addition to natural climate variability" —poses an existential crisis that threatens the viability of life on this planet.[i] The Intergovernmental Panel on Climate Change (IPCC) has stated unequivocally that human influence has resulted in warming of land, water, and the atmosphere at a "rate that is unprecedented in the last 2000 years." [ii]

Projections by the IPCC show global surface temperatures are likely to increase by 2.0 degrees Celsius by mid-century if emissions remain by current levels and by as much as 3.5 degrees Celsius by the end of the century. If emissions continue to increase, global surface temperatures are likely to increase by as much as 5.7 degrees Celsius. Even in models where carbon emissions are cut to net-zero by 2050, temperatures could increase by close to 2 degrees Celsius by mid-century and remain at this high level through the end of the century.

Changes in climate are expected to become more extreme "with every additional increment of global warming," [iii] including greater frequency and intensity of heat waves, precipitation events, droughts, and cyclone activity.[iv] Specifically, extreme weather patterns may lead to climate events such as floods and droughts, a reduction in agriculture and food security including crop yields, livestock production, and fish species due to heat stress, flooding, and increasing water temperatures. Decrease in water supply and quality due to increase in temperature, changes in precipitation, sea level rise and large rainstorms may cause large amounts of pollutants to enter rivers and estuaries. Finally, atmospheric warming may lead to a decrease in air quality by increasing ground-level ozone and/or air pollution.

Climate change and kidney health

The diverse detrimental effects of climate change are compounded for people with kidney diseases as this population is both more susceptible to the direct health impacts of climate change and vulnerable to breakdowns in the health care infrastructure during natural disasters.[v]

Multiple cardinal features of climate change directly impact kidney health. First, heat exposure and dehydration have been implicated in epidemics of chronic kidney failure in Latin America and elsewhere (i.e., Mesoamerican nephropathy), and are also risk factors for kidney stones

and acute kidney injury. Second, poor air quality has been linked to progressive chronic kidney failure.[vi] Vector-borne illnesses remain important causes of kidney diseases in developing countries and are becoming more prevalent across the world, including in developed countries and previously inhospitable climates, due to changes in temperature, precipitation modification of the landscape, and human behavior that increases vector-human contact. [vii]Finally, given that people with kidney diseases tend to have multiple other chronic conditions, such as heart and lung disease, and are prone to infection, the impact of climate change is likely to disproportionately impact this population. [viii]

More than 500,000 Americans with kidney failure require daily or thrice weekly dialysis treatments to live, and the majority of these people receive thrice weekly hemodialysis treatments in an outpatient dialysis center.[ix] Disruption of medical infrastructure and access to a medically pure water supply necessary for dialysis during a natural disaster can be immediately life-threatening for this population.[x] The 230,000 Americans with kidney failure who have received a kidney transplant are similarly dependent on regular immunosuppressant medications and disruption to supply chains or distribution of these drugs can cause loss of their invaluable donor kidney.

More broadly, the population of people with kidney diseases is disproportionately composed of people at socioeconomic disadvantage who are also bearing the greatest burden of climate change.[xi] Kidney diseases are associated with social determinants of health and are even concentrated in geographic "hotspots," [xii] such as industrial farming areas, which are especially impacted by climate change. Further, kidney diseases may be associated with occupations that involve extended exposure to extreme temperatures and an increasingly hostile outdoor environment, such as agricultural labor, which are disproportionately held by people with lower socioeconomic status.[xiii, xiv] The confluence of socioeconomic, geographic, and climate change risk factors may increase the incidence of kidney diseases and disrupt access to care.[xv]

Impact of health care on climate change

Kidney health professionals must acknowledge that the health care industry itself is a significant contributor to greenhouse gas emissions and climate change. It is estimated that the delivery of health care accounts for up to 5% of annual global greenhouse gas emissions.[xvi] Compared with other developed countries, the U.S. health care system has an inordinately large carbon footprint, accounting for up to 10% of annual national emissions. If the U.S. health care sector were itself a country, it would rank 13th for global emissions.[xvii]

The management of kidney diseases contributes disproportionately to the overall environmental footprint of the healthcare industry due to the resource intensiveness of kidney replacement therapies. Hemodialysis, in particular, is an extremely water and power-hungry therapy, consuming approximately 156 billion liters of water and 1.62 billion kW/h of power in the treatment of around 2 million people per year. It also generates excessive amounts of plastic

waste, approximately 625,000 tons per year, most of which is produced and discarded of in an environmentally damaging manner.[xviii] In the U.K., it is estimated that receiving in-center hemodialysis nearly doubles an individual's annual carbon footprint.[xix]

Less is known about the emissions associated with home dialysis therapies, including peritoneal dialysis, although these are also thought to be significant due to regular long-distance transport of large amounts of pre-manufactured dialysate as well as tubing, drainage sets, caps, and other plastic waste.[xx] In addition to these environmental costs, the financial costs of kidney replacement therapy are significant and unsustainable in many low-and-middle-income countries, leading to millions of premature deaths related to kidney diseases each year. As the global burden of kidney diseases and demand for dialysis grows, depletion of natural resources will only further drive-up costs and exacerbate disparities in the delivery of kidney care.

Call to action

Kidney health professionals are experts in supporting the human body's ability to maintain homeostasis. Climate change threatens the homeostasis of global ecological systems, an imbalance which ultimately shapes kidney health. Climate change threatens to increase the incidence and prevalence of kidney diseases, disrupt access to care, and widen inequity in kidney health.

The more than 21,000 kidney health professionals who comprise the American Society of Nephrology are dedicated to creating a world without kidney diseases. ASN believes that climate health is kidney health, and calls on kidney health professionals across the globe to:

- Support people with kidney diseases to survive climate change by:
    - Researching the biological and population-level impacts of climate change on kidney health and developing interventions to mitigate these impact
    - Fostering community resilience to the impacts of climate change including disaster preparedness focused on kidney health care systems for extreme weather events
    - Broadening access to, and the supply chain for, existing therapies, such as home dialysis and transplantation, and developing new therapies, such as wearable or implantable artificial kidneys, which increase patient mobility and resiliency
- Diminish the contribution of kidney care to climate change by:
    - Preventing kidney diseases by addressing upstream risk factors such as access to nutrition, access to care, chronic stress from discrimination and inequality, early detection and intervention of genetic kidney diseases, and co-morbid conditions such as hypertension and diabetes
    - Researching the environmental footprint of kidney replacement therapies to better understand and mitigate the impact of necessary therapies in clinical practice

    - Utilizing more efficient technologies including state of the art reverse osmosis modules which decrease water usage and devices which generate dialysate at the point of care
    - Reducing medical waste, including plastic waste, at every opportunity
    - Increasing the adoption of telehealth and other technologies which lower carbon emissions
    - Fostering the development of new therapies for kidney failure with a focus on environmental sustainability
- Advocate for public policy to address climate change as a contributor to kidney health by:
    - Joining a growing number of medical societies and journals in sounding the alarm and calling on governments to strengthen efforts to meet emissions targets[xxi]
    - Fostering the development of sustainable dialysis technology and new therapies for kidney failure with a focus on sustainability and allocating funding accordingly
    - Developing guidelines and best practices for incorporating sustainability into clinical practice including collection and reporting of data on resource usage
    - Promoting sustainable procurement practices
    - Reducing barriers to telehealth[xxii]

The voices of kidney health professionals are critical to bring attention to the growing impact of climate change on kidney health and people with kidney diseases. Kidney health professionals must call for policy and interventions to address climate change.

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[iii] Ibid

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