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Impact of Climate Change and Its Association to Acute Kidney Injury-Related Emergency Department Visits and Hospital Admissions

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Objectives : Acute kidney injury (AKI) is a severe renal condition, with rising temperatures from climate change increasingly linked to its incidence and healthcare burden. The aim of this study was to estimate the risk projection of temperature on AKI-related emergency department visits and hospital admissions under four Shared Socioeconomic Pathways (SSPs) possible future climate scenarios using the Intergovernmental Panel on Climate Change (IPCC) model.
Methods : A retrospective study was conducted on 12,156 AKI patients across five hospitals in three Indonesian cities. The radial basis function was employed to estimate past exposure to temperature, $PM_{2.5}$, and relative humidity (RH) for each patient over 1-year, 5-year, and 10-year periods. Future temperature projections were derived from global climate model (GCM) outputs, ranging from the optimistic (SSP126) to the pessimistic (SSP585) scenarios. Multinomial logistic regression and exposure-response analysis were used to estimate the future risk of AKI-related emergency visits and hospital admissions
Results : A 1°C increase in 1-year, 5-year, and 10-year average temperatures was associated with 1.004-fold (95% CI: 1.003-1.005) and 1.332-fold (95% CI: 1.327-1.338), 1.004-fold (95% CI: 1.002-1.005) and 1.303-fold (95% CI: 1.298-1.308), and 1.005-fold (95% CI: 1.004-1.006) and 1.282-fold (95% CI: 1.278-1.287) increase in the OR for AKI-related emergency department visits and hospital admissions. We observed a non-linear association between temperature under SSP126, SSP245, SSP370, and SSP585 with AKI-related emergency department visits and hospital admissions, with the highest OR increases observed in 2033 at 33.4% and 32.3%, 27.6% and 32.3%, 29.1% and 32.4%, and 27.2% and 32.3%, respectively.
Conclusions : Future temperature rise as a result of climate change increases the risk of AKI-related emergency department visits and hospital admissions in the coming years, with an expected increase of 8.0% and 2.5% per 1 °C increase, respectively. AKI patients may be more susceptible to poorer outcomes under climate change in the future.

Figure 1.jpg


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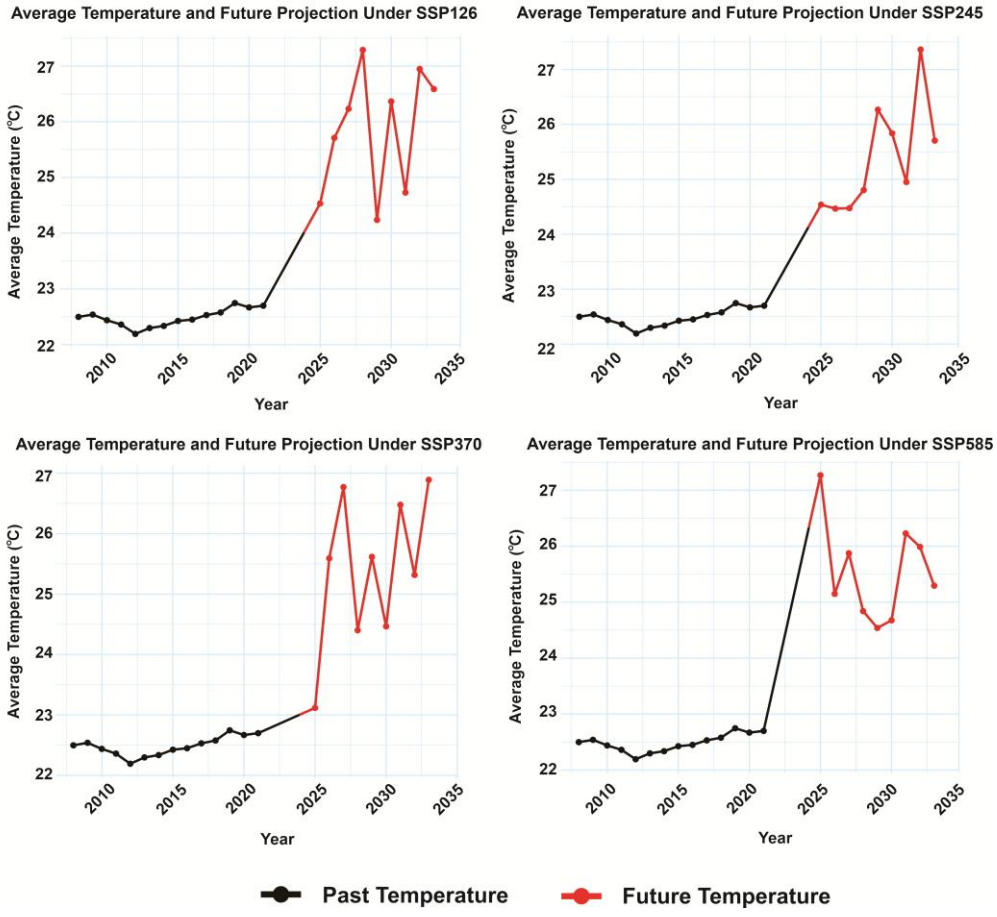
Beyond Challenges, Towards Healthier Kidney


Average Temperature and Future Projection Under SSP126
Average Temperature and Future Projection Under SSP245
Average Temperature and Future Projection Under SSP370
Average Temperature and Future Projection Under SSP585
Average Temperature (°C)
Year
22
23
24
25
26
27
2010
2015
2020
2025
2030
2035
Past Temperature
Future Temperature