

# LETTERS

## EFFECT OF CLIMATE CHANGE AND FOOD INSECURITY ON LOW-INCOME HOUSEHOLDS

In their recent article Gowda et al. describe a potential pathway by which food insecurity is associated with adverse health outcomes in the US population.<sup>1</sup> By measuring levels of C-reactive protein—a biomarker of inflammation linked to health conditions such as diabetes and cardiovascular disease—the study demonstrates a potential mechanism for how food insecurity can be a risk factor for chronic disease. This finding is alarming when we consider how climate change may influence food prices in the future, potentially leading to an increase in the number of food insecure households. The ability to produce food requires a supportive stable environment. Climate change threatens this environment through fluctuating temperatures, rainfall and humidity, and severe weather events such as heatwaves, floods, droughts, and storms.<sup>2</sup> A recent study by German economist Dirk Willenbockel forecasts that food prices will continue to spike as extreme weather events caused by climate change worsen.<sup>3</sup> Nelson et al. suggest a real increase in agricultural food prices because of an increase in demand by

a growing population and negative impact on food productivity resulting from climate change.<sup>4</sup> Willenbockel in a separate study indicates that the price index of processed food other than rice and meat is projected to rise by around 20% between 2010 and 2030.<sup>5</sup> As the authors of this article point out, the ability to access nutritious, safe, affordable, and enjoyable food is a prerequisite for health; so even a small shift in food prices could mean that already vulnerable populations are at increased risk for chronic disease.

Gowda et al. show that people in the marginally food-insecure group were more likely to be obese than the general population. This link between food insecurity and obesity is of significant concern as it is well established that obesity is a risk factor for chronic conditions such as heart disease and type 2 diabetes. Climate change–induced food-price increases could potentially shift currently food-secure households into the marginally food-insecure group, placing them at greater risk for obesity. This would have significant implications for the US population, for which obesity has become the second leading cause of disease and death, trailing only tobacco use.<sup>6</sup>

Chronic disease is a significant issue in the United States, with more than 78% of health spending devoted to people with chronic conditions.<sup>7</sup> A shift of individuals from the marginally food-insecure group to the highly food-insecure group resulting from an increase in food prices would further impact an already overburdened health system. Climate change–related food prices will hit poorest households hardest. Public health programs that address chronic disease need to also incorporate the impact of climate change on food security. ■

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### GOWDA ET AL. RESPOND

We thank Dodge for highlighting the potential environmental factors that may impact food insecurity upstream of the mechanistic pathway between food insecurity and health. Our work demonstrated that food insecurity is associated with C-reactive protein, a marker of inflammation associated with chronic health conditions such as diabetes, hyperlipidemia, and cardiovascular disease. In our exploratory study, we focused primarily on associations at the individual and household level between socioeconomic conditions and biological processes such as nutritional deficiencies, susceptibility to infection, and increased inflammation.

Dodge expanded on the pathways we described to discuss how macrolevel forces, such as changes in climate and weather patterns, could negatively affect food pricing and availability, thereby potentially increasing the numbers of food-insecure individuals in the United

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