RESEARCH HIGHLIGHTS

Energy Saving May Kill: Evidence from the Fukushima Nuclear Accident

by Guojun He and Takanao Tanaka, *American Economic Journal: Applied Economics*

Context

Decades of research show the vast consequences of climate change, such as the threat to our freshwater supply, endangerment to coastal areas, and reducing agricultural and food production. Excess mortality caused by extreme weather is considered to be one of the most devastating. For example, it is estimated that the mortality cost alone could account for about 70 percent of the total damages in the U.S. by the end of the 21st century.

Two strategies have been developed to reduce and manage these growing risks. First, countries aim to reduce greenhouse gas emissions, which includes reducing energy consumption. Second, countries are working to adapt to climate change, which includes mitigating exposure to extreme weather such as through air conditioning. But adaptation measures—like air conditioning—requires the use of more energy. And, as temperatures become more extreme, more energy will be needed to adapt.

The Fukushima nuclear accident in 2011 offers a case study to investigate the role of energy use in protecting people's health. Following the nuclear accident in 2011, Japan gradually shut down all of its nuclear power plants, causing a countrywide power shortage. In response, the government launched large-scale energy-saving campaigns to reduce electricity consumption. For example, energy-saving targets were set that required different regions to reduce summer electricity usage by as much as 15 percent. The government paid particular attention to reducing the usage of air conditioning because it is the largest contributor to residential electricity consumption in Japan.
The researchers explored the impact of these energy-saving campaigns. Did people take action to reduce consumption in their own lives? And, what impact did reducing consumption have on mortality rates?

Methods

To investigate the health impacts of Japan's energy-saving campaigns, the researchers studied year-to-year changes in temperature and how those changes relate to mortality data both before and during the energy-saving campaigns. They also analyzed how people responded to the energy-saving campaigns. The researchers looked for keyword searches for "energy saving" and air conditioner penetration rates and spending on other cooling appliances data. Finally, they study whether an electricity price increase led people toward making these changes, or whether other non-financial incentives—such as moral suasion, information campaigns, and social pressures—played a larger role.

Key Findings

Reducing electricity consumption causes more people to die from extreme temperatures. The study finds that exposure to extreme temperatures leads to more premature deaths and that the weather effects become greater in areas with higher electricity-saving targets. The mortality risk is especially high in the summer (days above 30 °C), during which the energy-saving campaigns were intensively promoted. Drawing from this, the researchers estimate that each year about 7,710 people died prematurely because of the energy-saving policies. Notably, around 60 percent of the excess deaths occurred during the summer.

The energy-saving campaigns also increased the incidence of heatstroke (measured by ambulance use) in both the young (those aged 20–64) and old adult groups (those aged above 65). Most of the deaths were from the old adult groups.

Figure 1 · Trend in Electricity Consumption

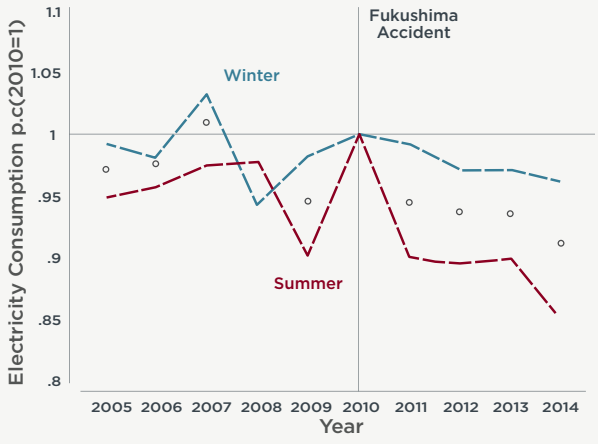
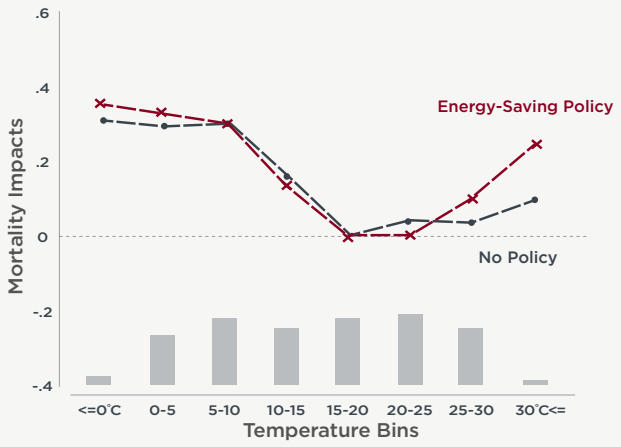


Figure 2 · Mortality Effects of Energy-Saving Policy



Note: This figure shows the mortality response to temperature exposure before and after the Fukushima Accident. The mortality response was intensified for hot temperatures when the energy-saving policy was enacted, like 25–0 °C and above 30°C, meaning that more people died from exposure to heat stress.

Reducing air conditioning use is likely the key factor that increases the mortality risk associated with extreme temperatures. The energy-saving campaigns were highly effective. People searched the ways to save electricity and reduced their use of air conditioning and bought more fans, as encouraged by the national government. The reduced air conditioning usage likely led to the significant changes in the temperature-mortality relationship during the energy-saving campaigns.

Non-financial incentives were highly effective in persuading people to reduce their electricity consumption. While power companies increased electricity prices, public opposition and heavy regulation in the power sector ultimately led to 5 to 6 percent annual price increases. As a result, the study finds that the price increases led to about 10 to 30 percent of the decline in Japan's summer electricity consumption. The majority of the reduction in summer electricity use came as a result of moral suasion tactics, information campaigns, and social pressures.

CLOSING TAKE-AWAY

While policies to reduce energy use, and therefore greenhouse gas emissions, can decrease the severity of future climate change, such policies can kill people living now because they reduce people's ability to protect themselves through adaptation measures like air conditioning. Policymakers should consider these tradeoffs when designing climate policies. Further, increasing the use of clean energy and energy efficiency measures may be better alternatives to reduced energy use in the future. Both better designed policies and the increase in clean energy and energy efficiency would be especially beneficial to developing countries where the majority of energy growth will occur, and where the use of adaptive measures like air conditioning will be most needed because of hot and rising temperatures in these regions.

The Energy Policy Institute at the University of Chicago (EPIC) is confronting the global energy challenge by working to ensure that energy markets provide access to reliable, affordable energy, while limiting environmental and social damages. We do this using a unique interdisciplinary approach that translates robust, data-driven research into realworld impacts through strategic outreach and training for the next generation of global energy leaders.